Regency® COMMUNICATIONS INC.

SERVICE MANUAL

VHF FM TRANSCEIVER

MODEL MCH 40

1227 S. PATRICK DR.
SATELLITE BEACH FL

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MICRO-COM SERIES SERVICE MANUAL

SECTION 1 GENERAL INFORMATION

1-1 Description
1-2 Specifications
1-3 Equipment Supplied
1-4 Equipment Available, Not Supplied
1-5 Equipment Not Supplied
1-6 Installation
1-7 Operation
1-8 Crystal Specifications
1-9 Crystal Installation

SECTION 2 CIRCUIT DESCRIPTIONS

2-1 Main Board, Receiver
2-2 Audio Circuits
2-3 Control Board
2-4 Transmitter, Main Board and PA Deck
2-5 Receiver and Transmitter Block Diagram

SECTION 3 ALIGNMENT AND TUNING PROCEDURES

3-1 Transmitter and Receiver Alignment - TP14-116
3-2 Double-Tuned Transmitter - TP14-140

SECTION 4 DIAGRAMS, VOLTAGE DATA AND SCHEMATICS

4-1 Main Board Parts Placement (DWG.#704-015)
4-2 Main Board Parts Overlay Diagram (DWG.#704-014)
4-3 Main Board Schematic Diagram (DWG.#704-023)
4-4 Main Board Jumper Diagram (DWG.#704-025)
4-5 P.A. Board Parts Overlay Diagram (DWG.#604-056)
4-6 P.A. Board Parts Placement Diagram (DWG.#604-057)
4-7 P.A. Schematic Diagram (DWG.#604-058)
4-8 Control Board Parts Overlay Diagram (DWG.#604-067)
4-9 Control Board Parts Placement Diagram (DWG.#604-068)
4-10 Control Board Schematic Diagram (DWG.#604-059)
4-11 Main Board Parts Placement/Silkscreen (DWG.#704-050)
4-12 Main Board Parts Overlay Diagram (DWG.#704-052)
4-13 Main Board Schematic Diagram (DWG.#704-056)
4-14 Main Board Jumper Diagram (DWG.#704-053)
4-15 Voltage Data (Main Board prior to 3/79)
4-16 Voltage Data (Main Board after 3/79)

SECTION 5 PARTS LIST

5-1 P.A. Board
5-2 Control Board
5-3 Receiver Board (Units mfg. prior to 3/79)
5-4 Transmitter Board (Units mfg. prior to 3/79)
5-5 Receiver Board (Units mfg. after 3/79)
5-6 Transmitter Board (Units mfg. after 3/79)

SECTION 1 GENERAL INFORMATION

SECTION 1 GENERAL INFORMATION

1-1 DESCRIPTION

The Regency MICRO-COM H40 series radios are transistorized FM transceivers designed for operation in the VHF (132-174 MHz) communications band. The MICRO-COM H41 and MICRO-COM H44 models are one and four channel units respectively.

The transmitter and receiver sections can be pre-tuned to any frequency within the specified segment of the three bands (132-148, 148-162, 162-174 MHz). The two sections are independently tuned, thus either one can be tuned to a different frequency (within the proper segment) than the other. However, the maximum frequency spread for the transmitter section is ±1.5 MHz, while the receiver frequency spread is ±.75 MHz from a center tune-up frequency. In other words, the maximum difference between the lowest and highest frequency is 3MHz for transmit frequencies and 1.5 MHz for receive frequencies when center tune-up frequency is used. A special tune-up procedure (TP14-140) may be used to tune the transmitter for ±3 MHz from center frequency or a total of 6 MHz separation when a center tune-up crystal is used.

The receiver section is a double-conversion, super-heterodyne type receiver. Silicon transistors are utilized for dependability under widely varying ambient conditions. Also, Integrated Circuits are used, providing for compactness and circuit reliability. A crystal first IF filter and a ceramic second IF filter are employed for optimum performance where numerous channels are active within the same area of the country.

The transmitter section also utilizes silicon transistors throughout. Ruggedized RF power transistors (BET or Balanced Emitter transistor type) are employed for high power output, which typically is 50 watts. The heatsink insures that there is virtually no power drop off during lengthy transmissions. In addition, an SWR Bridge Limiting Circuit provides the necessary protection to the RF power transistors in the event the antenna or its coaxial feedline becomes open or shorted.

The transmitter employs direct F.M. for the ultimate in modulation capability. Internal controls are provided for setting the amount of deviation. The deviation control is adjusted for a maximum of ±5 KHz deviation, in conformance with FCC regulations.

The attenuation of spurious emissions from the transmitter, RF power output, frequency stability, performance under varying conditions of temperature and battery voltage, and other specifications, all exceed the limits required for Type Acceptance by the Federal Communications Commission.

NOTE: The Regency Type MICRO-COM H41 and H44 are type accepted under Parts 21,81,89, 91 and 93 (Part 90) of the F.C.C. Rules and Regulations.

1-2 SPECIFICATIONS

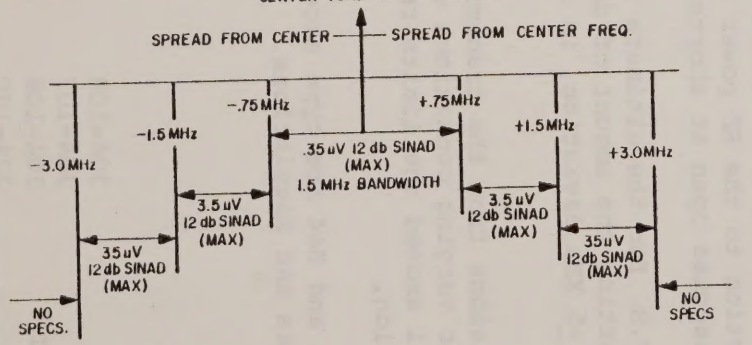
Transceiver Specifications	304-108
Transmitter Output Power Performance I	304-107
Transmitter Output Power Performance II	304-106
Sensitivity Performance	304-100
Self Quieting Spurious	304-101

DWG. NO. 304-100 SH 1 REV A

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	RELEASE R-024	5-5-78	CJH/MB

CHART 1

CENTER TUNE UP FREQUENCY



COMPUTATION TABLE (SEE NOTE 3)			
(STEP 1) RECEIVE FREQ	(STEP 2) LARGEST/SMALLEST	(STEP 5) SPREAD FROM CENTER	(STEP 6) WORST EXPECTED 12db SINAD
F1-151.625 MHz	SMALLEST	-1.0 MHz	3.5 uV
F2-152.125 MHz		-.5 MHz	.35 uV
F3-152.625 MHz		CENTER	.35 uV
F4-153.625 MHz	LARGEST	+1.0 MHz	3.5 uV

NOTES:

1. THE CENTERMOST FREQUENCY SHOULD BE SELECTED TO TUNE THE RECEIVER.
2. RECEIVER SENSITIVITY DEGREDATION MAY BE COMPUTED BY FOLLOWING THE STEPS LISTED BELOW AND BY USING THE COMPUTATION TABLE TO THE LEFT.
3. STEP 1 - WRITE FREQUENCY DOWN
   STEP 2 - DETERMINE LARGEST AND SMALLEST VALUE
   STEP 3 - Δ = LARGEST - SMALLEST = BAND SPREAD
   Δ = 153.625 - 151.625
   Δ = 2.0 MHz
   STEP 4 - BEST CENTER FREQUENCY (BCF)
   BCF = SMALLEST + ($\Delta \div 2$)
   BCF = 151.625 + 2.0 MHz $\div$ 2
   BCF = 151.625 + 1.0 MHz
   BCF = 152.625
   IF BCF IS NOT F1, F2, F3 OR F4, CHOOSE CLOSEST VALUE & USE FOR BCF.
   STEP 5 - COMPUTE SPREAD FROM CENTER OF EACH FREQUENCY.
   F1-BCF = 151.625 - 152.625 = -1.0 MHz
   F2-BCF = 152.125 - 152.625 = -0.5 MHz
   F3-BCF: 152.625 - 152.625 = CENTER
   F4-BCF = 153.625 - 152.625 = +1.0 MHz
   STEP 6 - COMPUTE WORST QUIETING FROM CHART 1
   F1 - -1.0 MHz (FALLS BETWEEN -.750 MHz & -1.5 MHz) THEREFORE, READ DOWN THE COLUMN TO 3.5 uV
   F2 - SIMILAR TO F1
   F3 - SIMILAR TO F1
   F4 - SIMILAR TO F1

			APPROVALS	DATE
		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCES ARE: FRACT ± DEC .xx± .xxx± ANGLE ±	DRAWN dw	5-78
			CHECKED CMcC	5-78
			QPTG SUPV. MB	5-9-78
		MATERIAL —	ENGR CJH	5-9-78
	MCH 40	FINISH —		
NEXT ASSY	USED ON			
APPLICATION		DO NOT SCALE DWG.		

Regency COMMUNICATIONS INC.
SATELLITE BEACH, FLORIDA 32937

SENSITIVITY PERFORMANCE DEGREDATION

SIZE B | PART NUMBER 304-100 | REV A | SCALE — | SHEET 1 OF 1

BISHOP GRAPHICS/ACCUPRESS REORDER NO. A-2306

DWG. NO. 304-101 SH 1 REV A

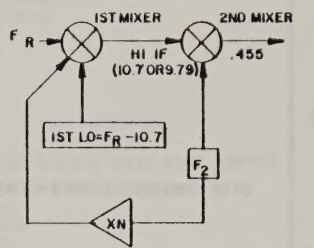
REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	RELEASE R-024	5-5-78	MB CH

2ND LOCAL OSCILLATOR SELF QUIETING SPURS
MODELS AFFECTED
BTH 201
BTH 202
BTH 204
BTH 201A
BTH 202A
MICRO COM V21
22
24
21H
22H
24H
24S
24SH
21TTS
21T
21PA
21TTS/PA
21T/PA
MICRO COM H 41A
41B
41C
44A
44B
44C
CARRY COM HIL
I
IH
5L
5
5H
BTH 201B
BTH 202B

TABLE OF SELF QUIETING SPURS
1ST & 2ND ORDER 2ND LO GENERATED

SELF QUIETING SPURS (MHz) FR	2ND LO FREQ (MHz) F2	HARMONIC ORDER (N)	ALTERNATE 2ND LO FREQ (MHz) F2
174.165	10.245	17	11.155
175.075		17	
163.920		16	
164.830		16	
153.675		15	
154.585		15	
143.430		14	
144.340		14	
133.185		13	
134.095		13	
167.325	11.155	15	10.245
166.415		15	
156.170		14	
155.260		14	
145.015		13	
144.105		13	
133.860		12	
132.950		12	

RECEIVER BLOCK DIAGRAM



$F_R = N\ F_2$ OR
$F_R = N\ F_2 + .91$ (FOR 10.245)
$F_R = N\ F_2 - .91$ (FOR 11.155)

NOTES:

1. ALL RECEIVER FREQUENCIES THAT FALL WITHIN ±.030MHz OF THE VALUE LISTED IN THIS TABLE REQUIRE THE USE OF THE ALTERNATE 2ND LOCAL OSCILLATOR CRYSTAL FREQUENCY IN ORDER TO AVOID SELF QUIETING SPURS.

			APPROVALS	DATE
		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCES ARE: FRACT. ± DEC. xx± .xxx± ANGLE ±	DRAWN dw	5-78
			CHECKED	5.78
		MATERIAL	DFTG. SUPV MB	5-9-78
		FINISH	ENGR.	5-9-78
	MCH-90			
NEXT ASSY	USED ON			
APPLICATION		DO NOT SCALE DWG.		

Regency COMMUNICATIONS INC.
SATELLITE BEACH, FLORIDA 32937

SELF QUIETING SPURS

SIZE B PART NUMBER 304-101 REV A

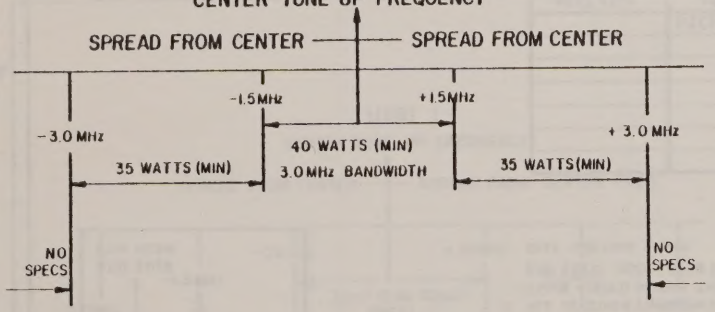
SCALE ____ SHEET 1 OF 1

BISHOP GRAPHICS/ACCUPRESS REORDER NO. A 2304

DWG. NO 304-106 SH 1 REV B

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	RELEASE R-030	6-20-78	GWH 6-4-78
	B	EN AA-397 CM°C	9/1/10	MKS

CHART I
CENTER TUNE UP FREQUENCY



NOTES:

1. THE TRANSMITTER MUST BE TUNED BY TEST PROCEDURE 14-140 (DOUBLE TUNED) FOR THIS COMPUTATION METHOD TO BE USED.
2. TRANSMITTER POWER OUTPUT DEGRADATION MAY BE COMPUTED BY FOLLOWING THE STEPS LISTED BELOW AND THE COMPUTATION TABLE TO THE LEFT.
3. STEP 1- WRITE FREQUENCY DOWN
   STEP 2- DETERMINE LARGEST AND SMALLEST VALUE.
   STEP 3- Δ = LARGEST - SMALLEST = BAND SPREAD
   Δ = 155.125 - 150.125
   Δ = 5.0 MHz
   STEP 4- BEST CENTER FREQUENCY (BCF)
   BCF = SMALLEST + ($\Delta \div 2$)
   BCF = 150.125 + 5.0 MHz ÷ 2
   BCF = 150.125 + 2.5 MHz
   BCF = 152.625
   IF BCF IS NOT F1, F2, F3 OR F4, CHOOSE CLOSEST VALUE & USE FOR BCF
   STEP 5- COMPUTE SPREAD FROM CENTER OF EACH FREQUENCY
   F1-BCF = 150.125 - 152.625 = -2.5 MHz
   F2-BCF = 152.125 - 152.625 = -0.5 MHz
   F3-BCF = 152.625 - 152.625 = CENTER
   F4-BCF = 155.125 - 152.625 = +2.5 MHz
   STEP 6- COMPUTE WORST QUIETING FROM CHART I
   F1 — -2.5 MHz (FALLS BETWEEN -1.5MHz & -3.0MHz) THEREFORE, READ DOWN THE COLUMN TO 35W
   F2 — SIMILAR TO F1
   F3 — SIMILAR TO F1
   F4 — SIMILAR TO F1

COMPUTATION TABLE (SEE NOTE 3)

(STEP 1) RECEIVE FREQ	(STEP 2) LARGEST/SMALLEST	(STEP 5) SPRD FRM CTR	(STEP 6) WORST EXPECTED PWR OUT
F1-150.125 MHz	SMALLEST	-2.5 MHz	35W
F2-152.125		-.5 MHz	40W
F3-152.625		CENTER	40W
F4-155.125	LARGEST	+2.5 MHz	35W

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCES ARE: FRACT ± DEC .xx± .xxx± ANGLE ±	APPROVALS	DATE
			DRAWN dw	6-78
			CHECKED	6-78
			OPTG. SUPV	6-78
		MATERIAL	ENGR	6-78
	MCH-40	FINISH		
NEXT ASSY	USED ON			
APPLICATION		DO NOT SCALE DWG.	304-106	

Regency COMMUNICATIONS INC. SATELLITE BEACH, FLORIDA 32937

TRANSMITTER PWR OUTPUT PERFORMANCE DEGRADATION (DOUBLE TUNED)

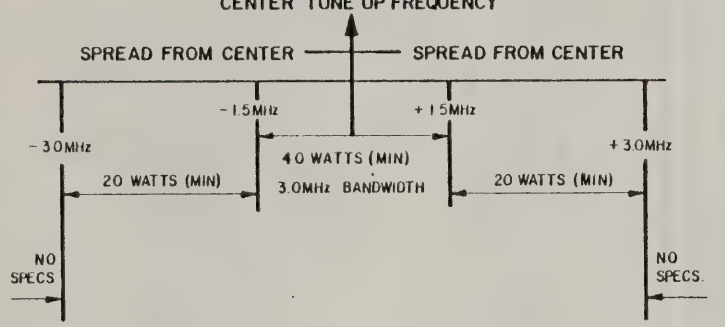
SIZE B | PART NUMBER 304-106 | REV B | SCALE | SHEET 1 OF 1

BISHOP GRAPHICS/ACCUPRESS REORDER NO A-2306

DWG NO. 304-107 | SH 1 | REV B

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	RELEASE R-030	6-20-78	CH/CW
	B	EN AA-397 CH.C	9/11/78	[illegible]

CHART I
CENTER TUNE UP FREQUENCY



NOTES:

1. THE CENTERMOST FREQUENCY SHOULD BE SELECTED TO TUNE THE TRANSMITTER PER TP14-116
2. TRANSMITTER POWER OUTPUT DEGRADATION MAY BE COMPUTED BY FOLLOWING THE STEPS LISTED BELOW AND THE COMPUTATION TABLE TO THE LEFT.
3. STEP 1 - WRITE FREQUENCY DOWN
   STEP 2 - DETERMINE LARGEST AND SMALLEST VALUE
   STEP 3 - Δ = LARGEST - SMALLEST = BAND SPREAD
   Δ = 154.625 - 150.625
   Δ = 4.0 MHz
   STEP 4 - BEST CENTER FREQUENCY (BCF)
   BCF = SMALLEST + (Δ ÷ 2)
   BCF = 150.625 + 4.0MHz ÷ 2
   BCF = 150.625 + 2.0MHz
   BCF = 152.625
   IF BCF IS NOT F1, F2, F3 OR F4, CHOOSE CLOSEST VALUE & USE FOR BCF.
   STEP 5 - COMPUTE SPREAD FROM CENTER OF EACH FREQUENCY
   F1-BCF = 150.625 - 152.625 = -2.0MHz
   F2-BCF = 152.125 - 152.625 = -0.5MHz
   F3-BCF = 152.625 - 152.625 = CENTER
   F4-BCF = 154.625 - 152.625 = +2.0 MHz
   STEP 6 - COMPUTE WORST EXPECTED POWER FROM CHART I
   F1 — -2.0MHz (FALLS BETWEEN -1.5MHz & 3.0MHz) THEREFORE, READ DOWN THE COLUMN TO 20W
   F2 — SIMILAR TO F1
   F3 — SIMILAR TO F1
   F4 — SIMILAR TO F1

COMPUTATION TABLE (SEE NOTE 3)

	(STEP 1) RECEIVE FREQ	(STEP 2) LARGEST/SMALLEST	(STEP 5) SPREAD FROM CTR	(STEP 6) WORST EXPECTED PWR OUT
F1	150.625 MHz	SMALLEST	-2.0 MHz	20 W
F2	152.125		-.5 MHz	40 W
F3	152.625		CENTER	40 W
F4	154.125	LARGEST	+2.0MHz	20 W

			APPROVALS	DATE
		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCES ARE: FRACT ± DEC. xx± xxx± ANGLE ±	DRAWN dw	6-78
			CHECKED MB	6-78
			QA/QC SUPV MB	6-78
		MATERIAL	ENGR. [illegible]	6-26-78
	MCH-40	FINISH		
NEXT ASSY	USED ON			
APPLICATION		DO NOT SCALE DWG.	304-107	

Regency COMMUNICATIONS INC.
SATELLITE BEACH, FLORIDA 32937

TRANSMITTER PWR OUTPUT PERFORMANCE DEGRADATION
(CENTER TUNED)

SIZE B | PART NUMBER 304-107 | REV B
SCALE — | SHEET 1 OF 1

BISHOP GRAPHICS/ACCUPRESS REORDER NO. A-2304

No	GENERAL	NOMINAL	GUAR
1	CHANNELS	1/4	——
2	FREQ RANGE	132-174 MHz 3 BANDS	——
3	OPERATING TEMP	-30°C TO +60°C	——
4	OPERATING DUTY CYCLE	EIA INTERMIT 1/4 MIN 5/15 MIN 8 HR/3CYCLE	——
5	SIZE (W-D-H)	6 1/2" x 10 3/4" x 2 5/8"	16.5 x 27.3 x 6.7 (CM)
6	WEIGHT (INSTALLATION)	4 1/2 lbs	2.04 Kg
7	POWER	13.6 VDC	——
	CURRENT DRAIN	@ 13.6 VDC	——
8	RCVR SQUELCH	100 MA ✻	——
9	RCVR MAX AUDIO	800 MA ✻	——
10	TRANSMIT	9A ✻ (✻ ADD 300 MA BELOW 0°C)	——
11	ANTENNA	50 Ω	——
12	CHANNEL SPACING	30 KHz OR 25 KHz	——

No	RECEIVER	NOMINAL	GUAR
	SENSITIVITY		
13	20 DB Q	.35 uV	.5uV (MAX)
14	12 DB SINAD	.25 uV	.35uV (MAX)
	AUDIO SQ SENSITIVITY		
15	THRESHOLD	.20uV	.25 uV (MAX)
16	TIGHT	.55 uV	.7 uV (MAX)
17	CLOSS	——	.20 uV (MAX)
18	ADJ CH SEL 20DB	120 db	100 db (MIN)
19	ADJ CH DESENSE 12DB	83 db	80 db (MIN)
20	OPERATING BANDWIDTH	± 750 KHz FROM CTR	(SEE 304-100)
21	SPURIOUS & IMAGE	80 db	75 db (MIN)
22	IM 20 DB Q	——	75 db (MIN)
23	IM 12 DB SINAD	——	75 db (MIN)
24	MAB	±6.5 KHz	±7.5 KHz
25	FREQ STAB TEMP	——	± .0005% (MAX)
26	FREQ STAB VOLTAGE	——	± .0001% (MAX)
27	AUDIO RESPONSE	——	EIA +2/-8-6db/OCT DE-EMPHASIS
28	AUDIO OUT PWR (MAX)	——	4W @ 5% DISTORTION

REVISIONS					
ZONE	REV	DESCRIPTION	BY	DATE	APPROVED
—	A	RELEASE R-030	dw	6-20-78	CJW/MC
—	B	EN AA-397	CMC	9/11/78	MC

NO	RECEIVER	NOMINAL	GUAR
29	AUDIO OUT PWR (MAX)	——	5W @ 10% DISTORTION
30	SQ BLOCKING	——	3KHz DEV, 300-3 KHz NONE EIA
31	RCVR ATTACK TIME	——	150 ms (MAX)
32	RCVR RELEASE TIME	——	250 ms (MAX)
33	HUM & NOISE RATIO	——	45 db/60 db (UNSQ/SQ)
34	UNDESIRED CONDUCTED (AC)	——	——
35	UNDESIRED CONDUCTED (RF)	——	——
36	UNDESIRED RADIATED	——	FCC
37	HIGH HUMIDITY	——	——
38	VIBRATION STAB	——	——
39	SHOCK STAB	——	——

	TRANSMITTER	NOMINAL	GUAR
40	PWR OUTPUT	48 W	40 W (MIN)
41	DC PWR IN TO FINAL	——	80W
42	FREQ STAB (TEMP)	——	± .0005% (MAX)

NO	TRANSMITTER	NOMINAL	GUAR
43	OUT FREQ STAB (VOLT)	——	.0001% (MAX)
44	SPUR & HARM CONDUCTED	——	-60 db (MAX)
45	SPUR & HARM RADIATED	——	-60 db (MAX)
46	OPERATING BANDWIDTH	± 1.0MHz FROM CTR	(SEE 304-106/304-107)
47	EMISSION	——	16 F3
48	MODULATION	——	±5KHz (MAX)
49	AUDIO FREQ DISTORTION	——	3% (MAX)
50	FM HUM & NOISE	——	-60db (MAX)
51	AM HUM & NOISE	——	34 db (MAX)
52	AUDIO FREQ RESPONSE	——	EIA: 17-3 6db/OCT PRE EMPHASIS
53	TRANS CARRIER ATTACK	——	EIA: 100 ms (MAX)
54	SIDEBAND SPECTRUM	——	EIA: -58 db
55	HIGH HUMIDITY	——	——
56	VIBRATION STABILITY	——	——
57	SHOCK STABILITY	——	——

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE FRACT DEC ANGLE X .X ± ± .XX ±	APPROVALS	DATE
			DRAWN dw	6-78
			CHECKED MC	6-78
		MATERIAL	QUALITY MC	6-78
			ENGR	6-78
		FINISH		
NEXT ASSY	USED ON			
APPLICATION		DO NOT SCALE DWG	304-108	

Regency COMMUNICATIONS INC
SATELLITE BEACH, FLORIDA 32937

SPECIFICATIONS

MICRO-COM H40 SERIES

SIZE	PART NUMBER	REV
B	304-108	B

SCALE —— SHEET 1 OF 1

1-3 EQUIPMENT SUPPLIED

a. 1 - Transceiver
b. 1 - Microphone and Connector
c. 1 - Mobile Mounting Bracket
d. 1 - Mobile Mounting Hardware
e. 1 - DC Power Cord and Fuse
f. 1 - Owner's Instruction Manual
g. 1 - External Speaker Connector

1-4 EQUIPMENT AVAILABLE, NOT SUPPLIED

a. Telephone Handset (MA-79) (MA-126)
b. Microphone (replacement use) (MA-83)
c. DC Power Cord (replacement use) (MA-168)
d. Accessory Plug Kit (MA-85)
e. CTCSS w/Call Light Circuit Encoder/Decoder (MA-164)
f. CTCSS Encoder (MA-166)
g. Standard Scanner (MA-127)
h. Priority Scanner (MA-129)
i. TTS Decoder (MA-123)
j. 2805 Decoder (MA-147)
k. Open Channel Scanner (MA-128)
l. Audio PA (MA-163)
m. Timeout Timer (MA-130)
n. Horn Relay Driver (MA-131)
o. Security Bracket (MA-12)
p. Quickmount Thumbscrews (MA-35)
q. Additional Mounting Bracket (MA-63)
r. External Speaker (MA-108)
s. Central Metering (MA-132)
t. CTCSS Two-Call Decoder/Encoder (MA-146)
u. R.F. Preselector (MA-305)

1-5 EQUIPMENT NOT SUPPLIED

a. 1 - Antenna
b. 1 - Coaxial Cable feedline
c. 1 - Coaxial Cable Connector
d. 1 - Power Supply (battery)

1-6 INSTALLATION

Mobile (12 VDC) Installation:

The MICRO-COM series transceivers are designed for installation in any vehicle that has a 12 VDC negative ground system. The RED lead, with the fuseholder, must be connected to the POSITIVE (+) terminal side of the battery. The BLACK lead should be connected to the NEGATIVE (-) terminal side of the battery, or to a metal chassis that is grounded to the negative terminal. In the event that the battery is remotely located, it may be necessary to install additional wires for properly connecting the radio to the battery's terminals.

Due to the use of the Mic Hang-up to control a function in the MICRO-COM, it is important that the hanger clip be securely grounded. If this is not accomplished by the mounting screws (many new vehicles have plastic dashboards) a separate wire must be added connecting to electrical ground or directly to the transceiver chassis.

THE ANTENNA USED SHOULD BE PROPERLY ADJUSTED FOR THE 50 OHM OUTPUT OF THE TRANSMITTER. A HIGH SWR WILL REDUCE THE POWER OUT, OR MAY EVEN SHUT OFF THE TRANSMITTER ENTIRELY.

Connections for an external (or remotely mounted) speaker are provided. These terminals are connected to the audio output and may be used as a convenient test point. In permanent installations, the internal speaker should be disconnected. The use of a 3 to 4 ohm external speaker (Regency MA-108) is recommended.

The remaining connector has no wiring installed and is provided for the users' convenience in connecting various special functions, accessories, etc. For wiring this connector, the Regency MA-85 Kit provides all necessary items.

1-7 OPERATION

The OFF-ON Switch is an integral part of the VOLUME control. Turning this control fully counter-clockwise until a click is heard will turn the unit off. Maximum volume, or audio output, occurs when the volume control is turned fully clockwise.

The receiver's audio is squelched off when the SQUELCH control is turned COUNTER-CLOCKWISE. Turning this control counter-clockwise until the noise just disappears (threshold squelch) permits the receiver to be "quiet" until an actual signal is received. With the squelch control set fully counter-clockwise, the receiver will still operate properly and will not be locked-out (prevented from responding to a received signal).

The MICRO-COM H44 is capable of operating on any one of four frequencies. The desired channel is selected by turning the Channel Selector to the position corresponding to the desired channel F1, F2, F3 or F4, the Indicator Lamp will light for that channel.

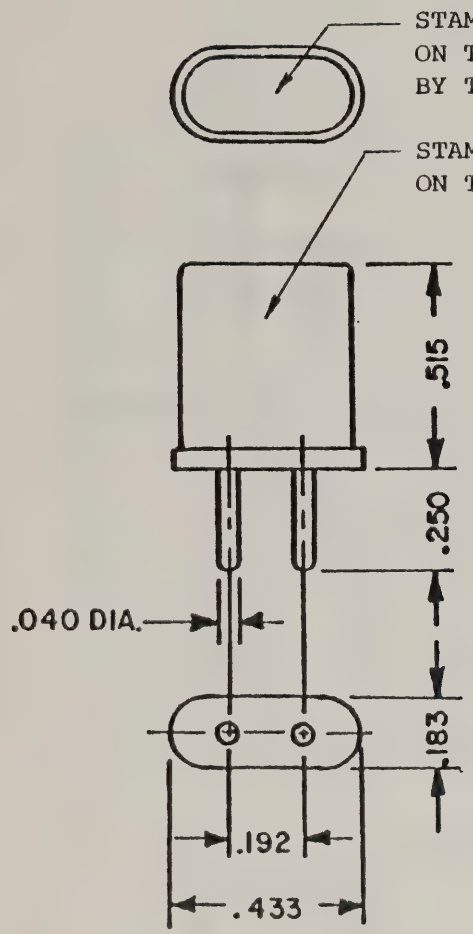
A high impedance ceramic microphone is supplied with the unit. To install the microphone on the unit, insert the connector plug into its socket with the locating tab toward the bottom of the radio. The connector is then locked into place by rotating the locking ring 1/4 turn clockwise.

To transmit a message, it is only necessary to press the push-to-talk button on the microphone and speak into the microphone. The Transmit Indicator will come on to signify that the transmitter is activated. Best results are obtained by holding the microphone about one inch from the lips and inclined at about a 30 degree angle away from the face. Speak clearly in a normal tone of voice across the face of the microphone.

1-8 CRYSTAL SPECIFICATIONS

Miniature plug-in crystals are utilized by both the receiver and transmitter sections. Because of the high accuracy (close tolerance) required, Regency crystals are recommended. Either receive or transmit crystals must be ordered by specifying the Channel Frequency and Part No. 2311-0000-000 for Receive or Part No. 2312-0000-000 for Transmit. Use of other manufacturers' transmit crystals may cause violation of the FCC Rules and Regulations.

If desired, the RECEIVE or TRANSMIT crystals may be purchased from other manufacturers. The following specifications must be included in the order.(See following drawings , 301-740(Receive), 301-741(Transmit))



NOTES:

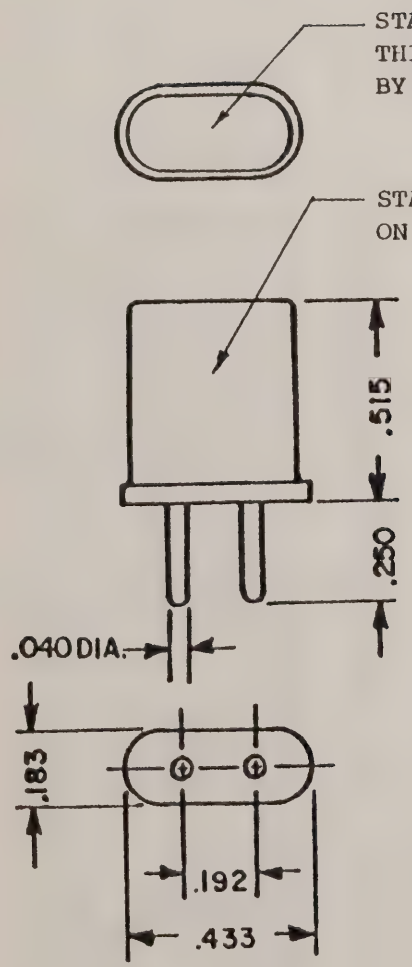
1. VENDOR MUST SUBMIT SAMPLES FOR APPROVAL BY CUSTOMER ENGINEERING DEPT. ANY VARIATION FROM APPROVED SAMPLE WITHOUT PERMISSION FROM CUSTOMER ENGINEERING DEPARTMENT IS AT THE RISK OF THE VENDOR.

2. DETERMINATION OF CRYSTAL FREQ. CRYSTAL:
   $\text{FREQ.} = \frac{\text{RECEIVER FREQ.} - 10.7}{3}$

3. CRYSTAL SPECIFICATIONS:
   - A. TYPE: MINIATURE PLUG-IN HC-25/U.
   - B. MODE: SERIES RESONANCE - 600 Hz.
   - C. MAX. EQUIV. SERIES RESISTANCE: 35 ohm
   - D. OVERTONE ORDER: 3RD
   - E. DRIVE LEVEL: 2MW

4. FREQUENCY TOLERANCE (AS MEASURED ON CRYSTAL - IMPEDANCE METER)
   - A. AT 25°C ±.001% (PER SPEC. 3B)
   - B. FROM -10 to +60°C: ±.002%

CRYSTAL-RECEIVE



NOTES:

1. VENDOR MUST SUBMIT SAMPLES FOR APPROVAL BY CUSTOMER ENGINEERING DEPT. ANY VARIATION FROM APPROVED SAMPLE WITHOUT PERMISSION FROM CUSTOMER ENGINEERING DEPT. IS AT THE RISK OF THE VENDOR.

2. THE CRYSTAL IS A CR-78/U BASIC TYPE MOUNTED IN A HC-25/U HOLDER.

3. THE FUNDAMENTAL FREQ. OF THE CRYSTAL IS $\frac{\text{TRANSMIT FREQ.}}{12}$ AND WILL NORMALLY BE FROM 12.5 MHz to 14.0 MHz.

4. LOAD CAPACITY IS 32 PICOFARADS.

5. CRYSTAL SERIES RESISTANCE SHOULD NOT BE MORE THAN 25 OHMS.

6. FREQUENCY CALIBRATION $\pm$0.001% AT +25°C.

7. TOLERANCE $\pm$0.0005% FROM -10°C to +60°C, REFERENCE TO +25°C.

CRYSTAL-TRANSMIT

1-9 CRYSTAL INSTALLATION

Prior to installing a crystal, the transceiver's cover will have to be removed. To remove this cover, unscrew the two large bolts located at the sides of the unit, and the four screws on the speaker cover wrap. The cover may then be slipped off by lifting it off the unit.

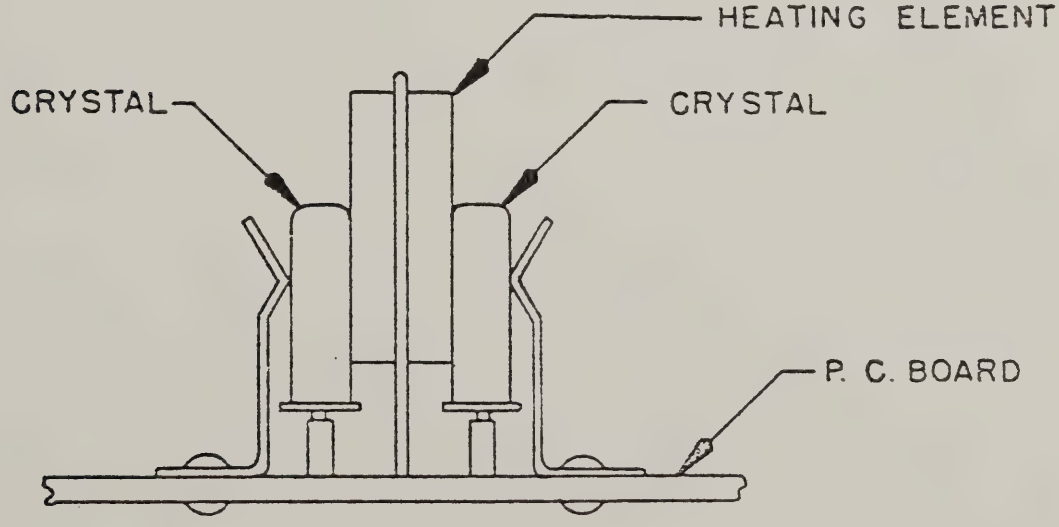
See Figure 1-3 for proper Crystal Location and Installation. Insert the Receive crystal in the proper channel; be sure the crystal is firmly seated in the socket pins.

Special care must be taken to install the crystals correctly. The conduction type crystal heater, which is used to heat the crystals at a very low ambient temperature, relies on having proper physical contact between the heater element and the crystal for effective operation. The Crystal Heater Detail (Figure 1-3) demonstrates the correct method of crystal installation. The crystal must be pressed down into the socket pins far enough for the rim around the bottom of the crystal to clear the heating element and allow good contact between the side of the crystal and the element.

For the TRANSMIT crystal, there is a variable inductor that is to be used for "Netting" (adjusting to the exact frequency) purposes. This netting should be made with an accurate frequency counter, such as Regency EC-175. See 3-8 for detailed Crystal Netting Procedure.

NOTE: FCC Regulations require that the TRANSMIT crystal be installed and adjusted "on frequency" under the supervision of a technician holding either a First or Second Class FCC license.

After the crystals are installed, and netted, re-install the speaker assembly.



CRYSTAL HEATER DETAIL FIG 1-3

SECTION 2 CIRCUIT DESCRIPTIONS

SECTION 2 CIRCUIT DESCRIPTIONS

2-1 RECEIVER RF FRONT END, OSCILLATOR, 1ST MIXER, AND 10.7 IF

Q201 is an RF amplifier with broad-band tuned circuits in its input and output circuitry. The output of the RF amplifier is coupled to the input of the mixer, Q202, a Field Effect transistor.

The first L.O. (local oscillator), uses third overtone crystals. (The number marked on the crystal is the receive frequency.) Oscillator injection to the mixer is accomplished by capacitive coupling between L208 and L209.

The 10.7 MHz output frequency from the mixer is coupled to the first selectivity element XF-201 through XF-203 which form a 6-pole crystal filter; output from the filter is coupled to the 10.7 MHz IF input.

2-2 IF - AUDIO CIRCUITS

The IF input circuitry consists of L212 and C224 (later models use R218 and C231). The output is fed to an Integrated Circuit, IC201, which contains the second mixer and L.O. circuitry, operating at 10.245 MHz. In some locations where a strong secondary Image Signal has been encountered, this oscillator's frequency is moved to 11.155 MHz. (The crystal frequency is stamped on the top of the crystal.)

The 455 KHz output of IC201 (terminal 3) is coupled to the input of the second selectivity element, CF201, a ceramic filter centered at 455 KHz. The output of CF201 is coupled through another tuned circuit to Pin 5 of IC201. In IC201 is a series of amplifiers providing approximately 100dB gain at 455 KHz. Also included in IC201 is the limiting circuitry and a quadrature detector circuit. L213, connected between terminals 8 and 4 of IC201, is the adjustable quadrature coil.

The audio output from IC201 (terminal 10) is coupled to the input of the audio amplifier circuit and to the input of the noise-operated squelch circuit by Q204 (Q204 is internal to IC201 on later models).

IC201 contains an amplifier whose frequency response extends from approximately 5 KHz to 25 KHz. IC201 amplifiers the "noise" occurring in this frequency range. The noise is coupled to CR203. CR203 is used as a detector which rectifies the amplified noise and produces a DC voltage at Pin 13 (Pin 14 later models) IC201. When the DC voltage at Pin 13 (Pin 14 later models) of IC201 is positive and of sufficient value the squelch switch in IC201 turns on and provides essentially a short circuit between the base of Q205 and ground. This action turns off Q205 and the audio output from the receiver is squelched (muted). When a signal (carrier) arrives, the noise input to the detector is reduced to the point where the DC voltage at the input to the squelch switch is no longer sufficient to cause Q205 to be turned off.

At this time, the audio amplifier (IC202) amplifies signals applied through the volume control to the input of the audio amplifier, IC202. The output of IC202 is capable of delivering 5 watts to the speaker.

2-3 CONTROL BOARD LAMPS

Channel Indicator:

When a particular channel is selected, the cathode of that channel's LED indicator is grounded and voltage to the LED is provided by the transceiver's supply voltage.

Transmit Indicator:

The Transmit Indicator functions similarly, except that the cathode is already grounded and voltage to the LED is provided by the transmitter supply voltage.

Pilot Lamp:

The Power Indicator is supplied current from the main A+ line and is on whenever SW3 is closed.

Call Indicator:

The Call Indicator is supplied current by the C.T.C.S.S. accessory being switched "on" to ground.

2-4 TRANSMITTER BOARD

Q308 is in a crystal oscillator circuit operating at approximately 13 MHz. Each crystal has a warp inductor in series with it. This inductor is used for fine (small) adjustments to the crystal's frequency.

The crystal heater assembly consists of R340 and four spring clips. R340 is located between four crystals in such a manner that the spring clips force the crystals into reliable physical contact with this resistor. Power dissipation in the resistor is sufficient to cause conduction heating of the crystals to above 0° when the ambient temperature is -30°C. Control circuitry, consisting of ST301 thermostat, automatically adjust the power delivered to the crystal heaters. Heater turn-on is nominally between 0°C and -5°C. Both heaters will be completely shut off at normal ambient temperatures. Refer to Figure 1-3 for detailed drawing.

The oscillator's frequency is frequency-modulated by a varactor diode, which is connected across the crystal circuit of the oscillator. Q307 is a buffer whose output frequency is three (3) times the crystal frequency.

The signal from Q307 is capacitively coupled to the base of Q306. Q306 is used as a doubler, a stage that multiplies its input signal's frequency by two. Thus, the output frequency of Q306 is six (6) times the crystal frequency. This signal is then applied to Q304, which is also operating as a doubler. The frequency of the output signal from Q304 is twelve (12) times the crystal frequency. This frequency is the ultimate transmitter output frequency.

Q303 is a power amplifier operating "straight through". Q303 provides the drive (RF signal) required by the "final" stages, Q101 and Q102, to deliver at least 40 watts of RF power to the antenna through the impedance matching network in the Q101 collector circuit.

The transmitter output transistor, Q101 is protected from damage due to excessive SWR on the antenna transmission line by the SWR Bridge and Drive Limiter circuits. In the event of a load mismatch at the antenna connector, the SWR Bridge consisting of

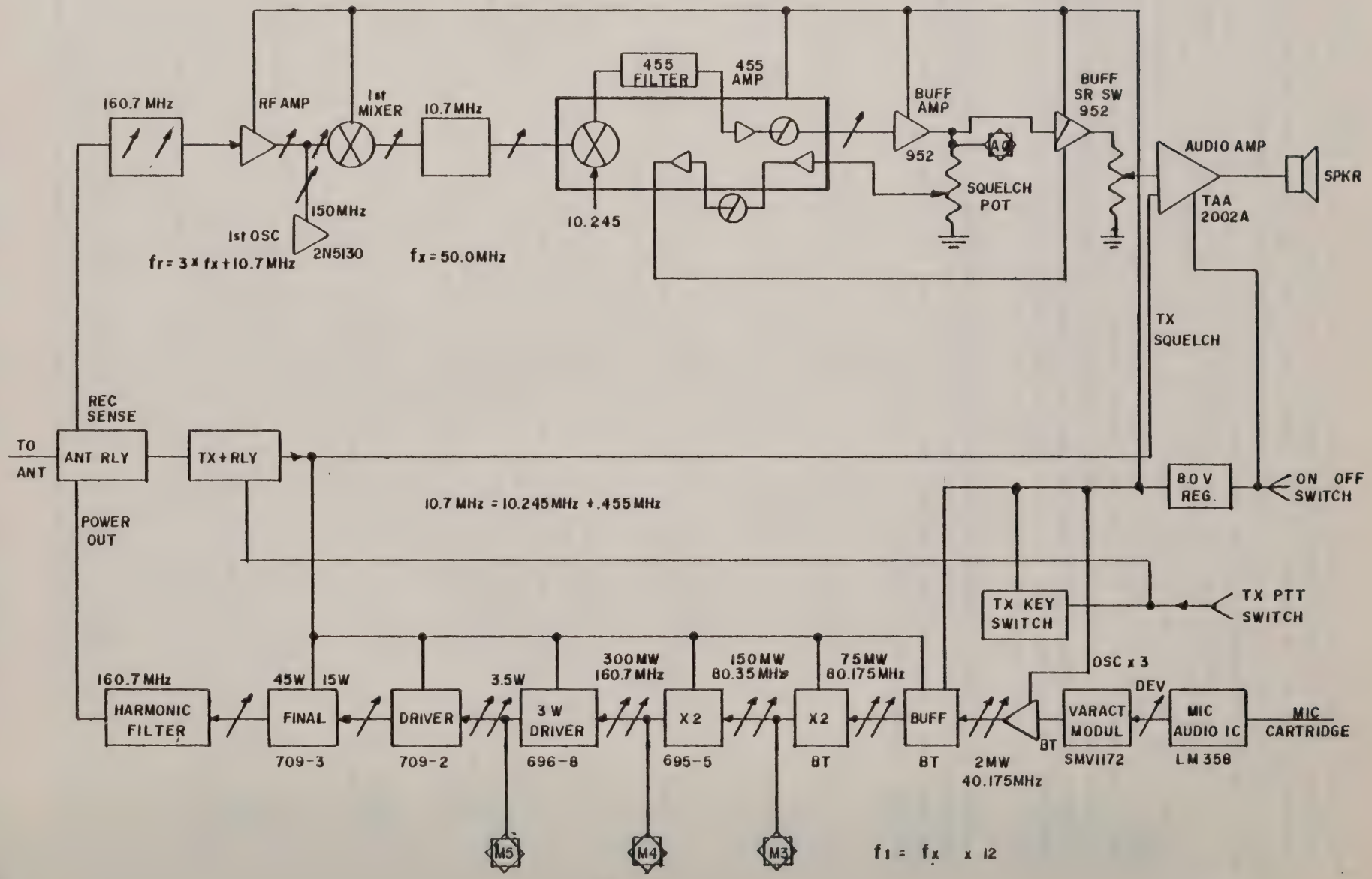
T101, R101, R102 and CR102 will detect the mismatch and send a signal to the Drive Limiter. The Drive Limiter (Q301 and Q305) will then bias Q304 in an off condition, preventing possible damage to the power amplifier (Q101). Load mismatch is detected by comparing the phases of output voltage and current to determine if standing waves exist on the feedline to the antenna.

Thw Transmitter Audio Section of the transmitter uses a Dual-Integrated-Circuit Operational Amplifier. Input signal from the high-impedance ceramic microphone is applied to the first amplifier section (IC301A) where it is amplified; when the input level, as amplified by IC301A, is large enough to turn on diodes CR301 and CR302, the circuit gain is reduced maintaining a maximum output level and preventing over-deviation of the transmitter. IC301B is an amplifier and low-pass filter to provide the proper frequency characteristic for the transmitted audio. R323 adjusts the signal level to the modulator diodes and thus is the deviation control.

The push-to-talk (PTT) Switch in the microphone applies a ground to the transmit-receive relay coil, which activates the relay. The T-R relay switches the supply voltage between the receiver and transmitter and switches the antenna between the receiver input and the transmitter output.

2-5 RECEIVER & TRANSMITTER BLOCK DIAGRAM

RECEIVER & TRANSMITTER BLOCK DIAGRAM



SECTION 3 ALIGNMENT AND TUNING PROCEDURES

APPLICATION	
NEXT ASSY	USED ON
	MCH 40

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
A	R-002	1-17-78	M.G. C.H.
B	AA-264	[illegible]	[illegible]
C	AB-052	[illegible]	[illegible]
D	AB-166	6-5-80	C.H.
E	AB-368	11-4-80	C.H.

REV. E SH. 1 TP14-116 DWG. NO.

FINAL TEST PROCEDURE MICRO-COM H 40 SERIES

A. Transmitter Alignment

I. Test Set-Up

A. Equipment

1. MICRO-COM H 40 Transceiver
2. HP 410 DC VTVM
3. DC Power Supply with Ammeter 13.6 VDC 10 Amps DC
4. VOM Simpson 360 (Digital)
5. AC VTVM
6. Audio Oscillator
7. Mic matching network
8. 150 MHz Thruline Wattmeter, 30 db Power Pad and 100 W Element
9. Spectrum Analyzer
10. Deviation Meter *
11. Frequency Counter *
12. Small Blade Tuning Tool and Hex Tuning Tool
13. Tune-Up Crystal
14. Band Reject Filter
15. PTT Switch

* Can be replaced with Cushman or similar equipment

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCES ARE FRACT. ± DEC .XX± .XXX± ANG. ±	APPROVALS	DATE
	DRAWN MF/C. MC	
	CHECKED	
	DFTG. SUPV.	
MATERIAL ———	ENGR. CJH	1-3-78
FINISH ———		

Regency® COMMUNICATIONS INC.
SATELLITE BEACH, FLORIDA 32937

TEST PROCEDURE MICROCOM H 40

SIZE	PART NUMBER	REV.
A	TP14-116	E

DO NOT SCALE DRWG.	SCALE ———	SHEET 1 OF 12

B. Test Interconnection Diagram

Transmitter Tests

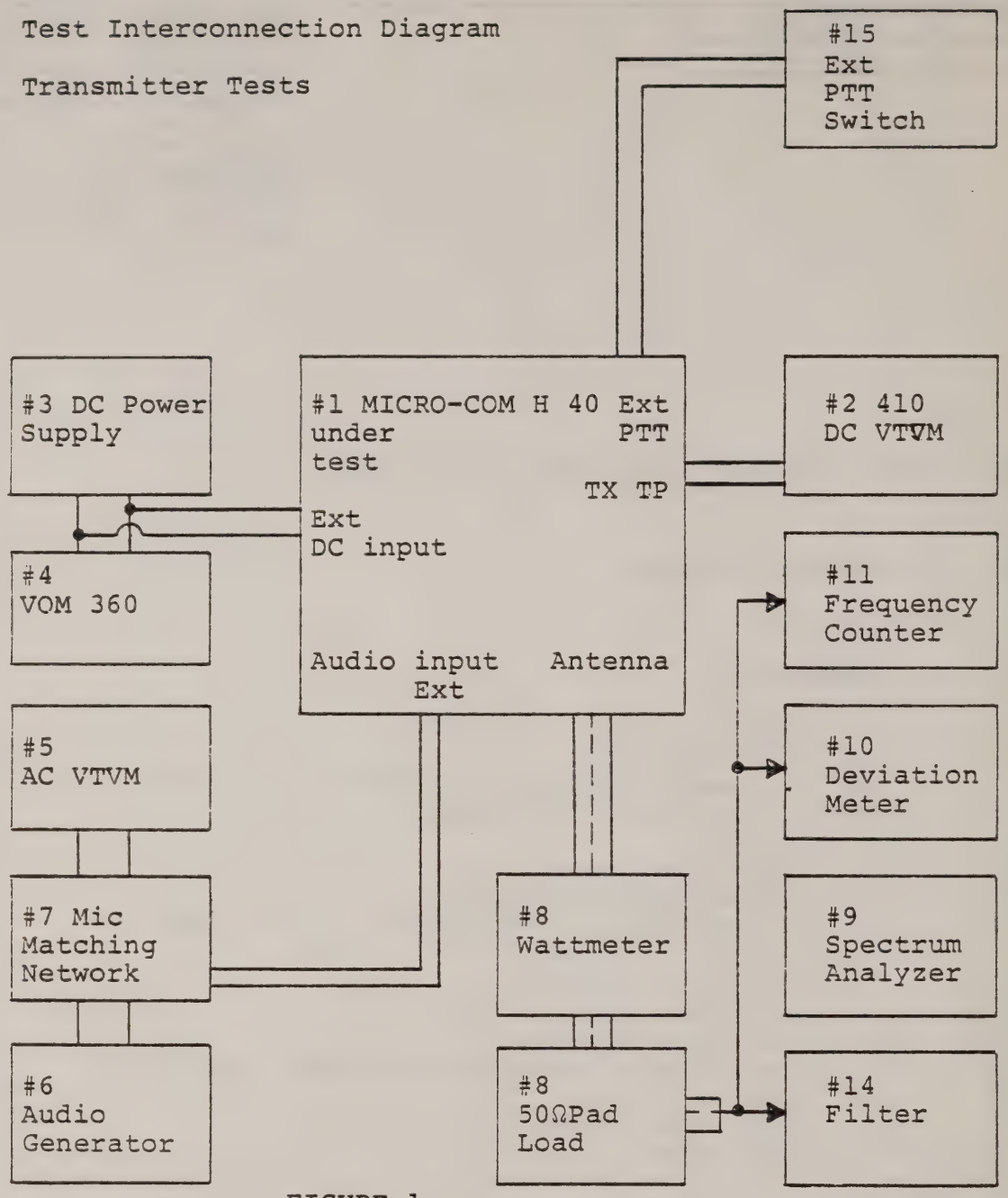
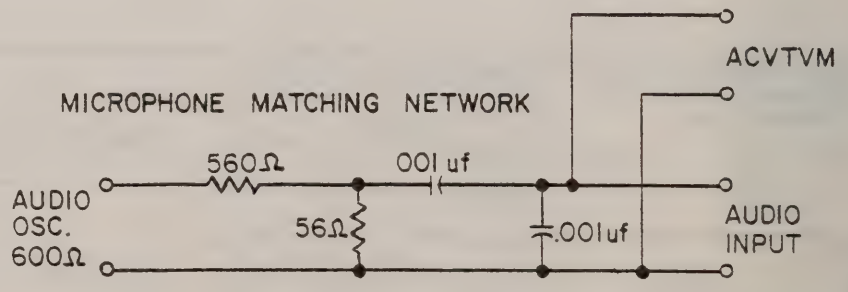


FIGURE 1



DRAWN MF / C. MC	DATE	SIZE A	PART NUMBER TP14-116	REV. E
APPROVED CJH	DATE 5 [illegible]			
DO NOT SCALE DWG.		SCALE ———		SHEET 2

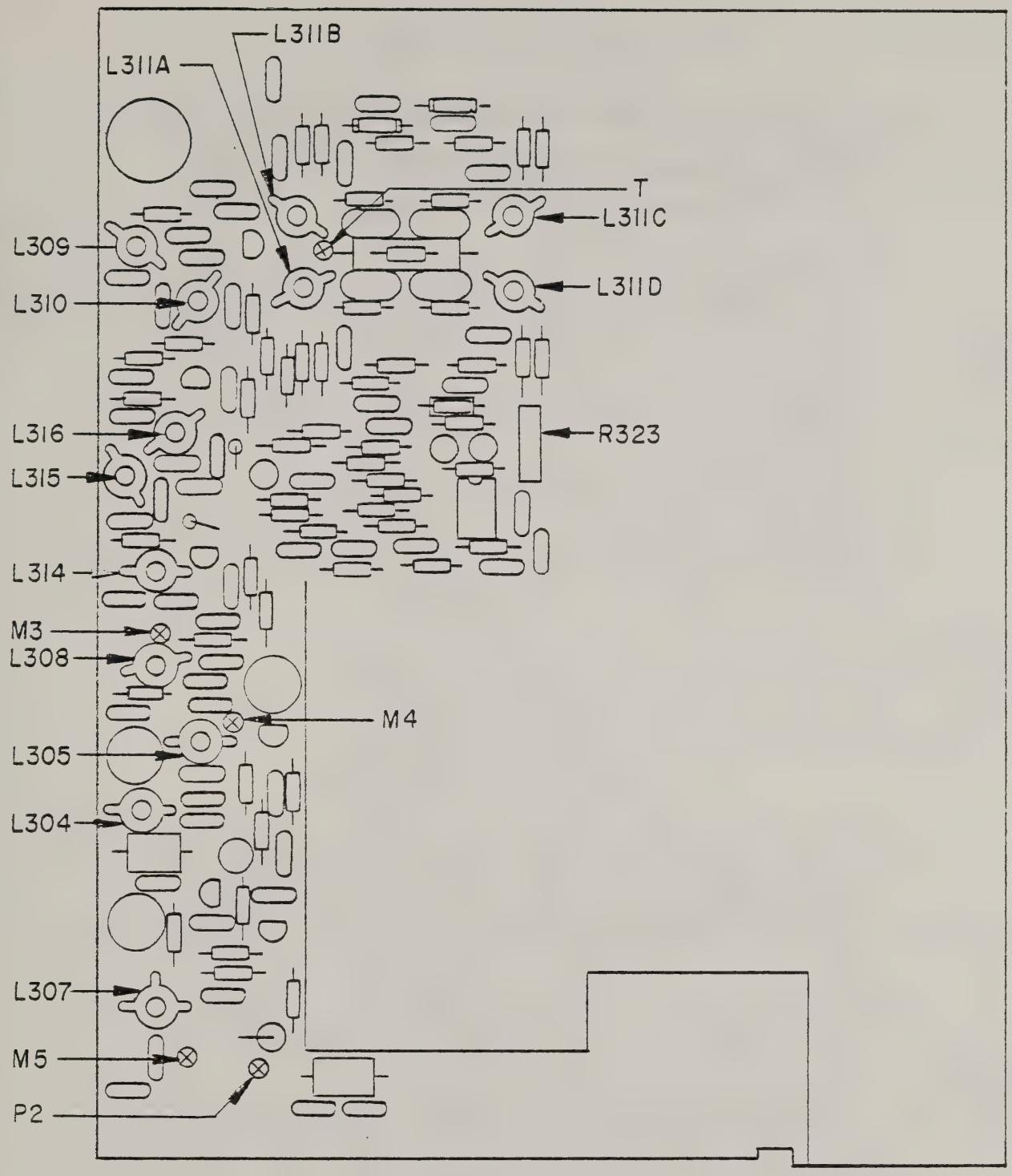


FIGURE 2

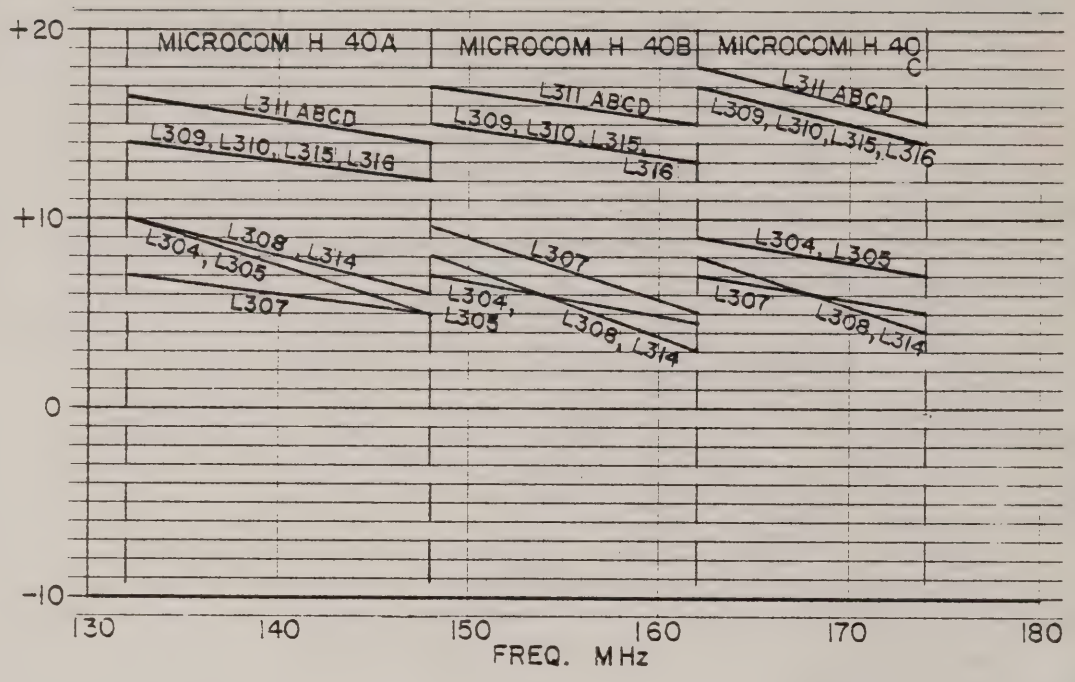
TRANSMITTER BOARD TUNING POINTS

DRAWN MF / C. MC	DATE	SIZE A	PART NUMBER TP14-116	REV. E
APPROVED	DATE			
DO NOT SCALE DWG.		SCALE ———		SHEET 3

GRAPH I FIGURE 5

TX COIL PRESETS

(FREQ. SENSITIVE COILS ONLY)

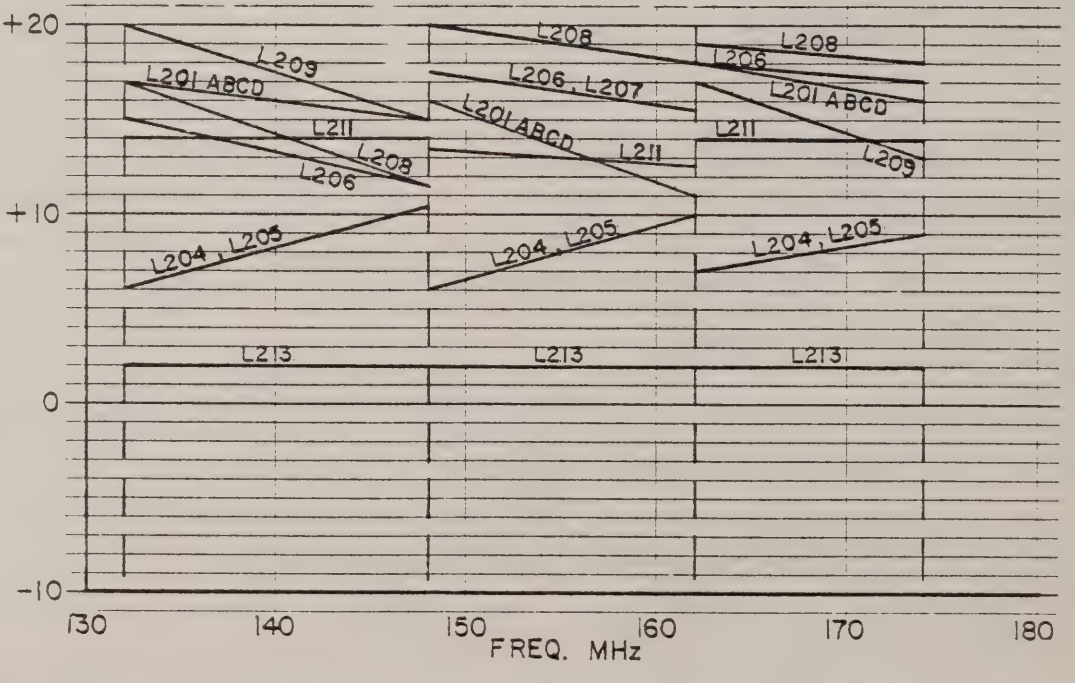


CW TURNS FROM TOP OF FORM

GRAPH II FIGURE 6

RX COIL PRESETS

(FREQ. SENSITIVE COILS ONLY)



CW TURNS FROM TOP OF FORM

DRAWN MF / C. MC	DATE	SIZE A	PART NUMBER TP14-116	REV. E
APPROVED	DATE			
DO NOT SCALE DWG.		SCALE ____		SHEET 4

II. A.1. Preset potentiometer R323 and R313 so that it is at mid range.

A.2. Preset coil cores as follows: (measured from top of form in turns)

Freq. Range		132-148 MHz	148-162 MHz	162-174 MHz
Coil	Color	MICROCOM H 40A	MICROCOM H 40B	MICROCOM H 40C
L311A,B,C,D	Grn	16.5	16.5	18
L309,L310	Org	14.5	13	16
L316,L315	Org	15	14	15
L314,L308	Red	9.5	5	6
L304	Wht	8	6	8
L307	Org	6.5	7	6
L305	Red	9	8	7

This Table indicates presets for center band tune-up. See Graph I, Figure 5 for other frequencies.

B. Insert center band tune-up crystal in F1 position as follows:

Freq. Range	132-148 MHz	148-162 MHz	162-174 MHz
Freq.	140 MHz	155 MHz	168 MHz

C. Insert External power connector and set Power Supply (#3) to 13.6 VDC as indicated on VOM(#4).

D. Insert external antenna connector and connect Spectrum Analyzer (#9) to pad (#8) through Band Reject Filter (#14).

E. Insert external PTT connector (#16).

F. Insert mic matching network. (#7)

G. On 4 channel models, set frequency selector to F1.

H. Turn on radio with ON/OFF Volume Switch.

III. Tune-Up Procedure (Refer to Figure #2).

A.1. Connect DC VTVM (#2) between P2 (+) and M3 (-) and DC VTVM (#2) to 5V scale.

2. Key transmitter with the external PTT. Listen for relays to click then proceed to next step.

B. Key transmitter with the external PTT and tune L315, L316, L310 and L309 in that order for maximum reading on DC VTVM #2. Voltage should be 1.75VDC ±.5V (M3).

C. Connect DC VTVM (#2) between P2 (+) and M4 (-), then set DC VTVM (#2) to 5.0V scale.

D. Tune L314 and L308 for maximum reading on DC VTVM (#2). Voltage should be 1.5 ±0.5 VDC (M4).

E. Connect DC VTVM (#2) between P2 (+) and M5 (-), then set DC VTVM (#2) to 2.5V scale.

F. Tune L304 and L305 for maximum reading on DC VTVM (#2). Voltage should be 0.5 ±0.2 VDC (M5).

G. Tune L307, C111, and C117 on the PA Deck for maximum power output as measured on wattmeter #8. Power should exceed 40W. For marine coast stations tune C11 clockwise to reduce output power to 50 watts if the station exceeds 50W.

H. Repeat Steps A1, B, C, D, E, F, and G.

I. Set the Spectrum Analyzer (#9) and Band Reject Filter (#14) for maximum carrier indication on the 0 db reference line. Attenuate the carrier with the Band Reject Filter (#14) a minimum of 30 db. Check for 2nd harmonic level on the Spectrum Analyzer. The second harmonic should be greater than 59 db down.

J. Check input current to the transceiver on the DC Power Supply (#3). This level should not exceed 12 amps.

K. Connect the Counter (#11) to the output of the Pad (#8) and set the warp control for F1 (L311A) for the nominal crystal frequency ±.0001 MHz in Section II B.

L. Connect Audio Signal Generator to the mike connector input using the appropriate matching network (#7), key transmitter and set the Audio Signal Generator (#6) for 1 KHz tone and 150 mv AC as indicated on the AC VTVM (#5).

M. Connect the deviation meter (#10) to the pad (#8) and adjust the deviation, adjust R323 for ±5 KHz deviation as measured on the Deviation Meter. Also adjust R313 for 3.8 VDC on Pin A10.

N. Check modulation sensitivity by reducing the Audio Generator Output until the deviation is ±3.0 KHz. Measure the Audio Generator Input Voltage on the AC VTVM. This level should be less than 20 mv AC.

O. On 4 channel models, reconnect the counter (#11) to the pad (#8) and check F2, F3, and F4 warp controls with the crystal. All positions shall be capable of being warped on frequency ±100 Hz. Repeat step L. Monitor with deviation meter (#10); deviation should be 4.5 KHz ±0.5 KHz.

P. Connect DC VTVM(#2) between T(+) and gnd(-). Then set DC VTVM to 50V scale.

Q. DC VTVM(#2) should read 13.6VDC. Cool thermostat ST301 below 5°C or 41°F. DC VTVM(#2) should read 0 VDC and crystal heater resistors R207 and R340 should begin to heat.

R. DC VTVM should read 13.6VDC when ST301 warms to 10°C or 50°F.

IV. Table of Performance Limits

PARAMETER	MIN	TYP	MAX	UNITS
M3	1.25	1.75	3.5	VDC
M4	1.0	1.5	2.0	VDC
M5	0.3	0.5	0.7	VDC
TX Power Output	40.0	50.0	60.0	Watts
Mic mod sens	---	15.0	20.0	mv
Deviation	---	---	±5	KHz
TX freq. error	---	±20.0	±250.0	Hz
TX freq. error W/ ±5KHz Dev.	---	± 300.0	± 500.0	Hz

B. Receiver Alignment

I. Test Set-up

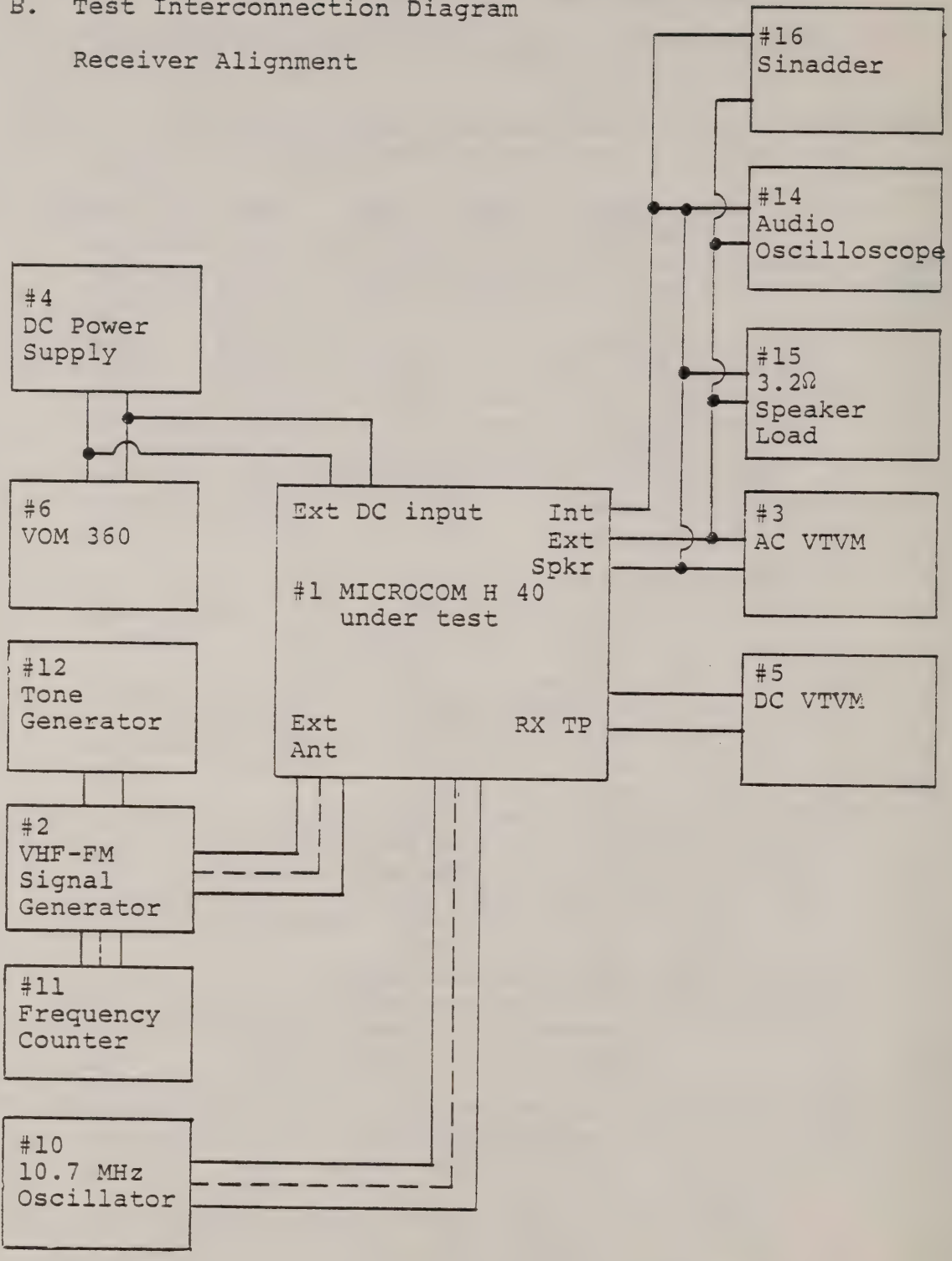
A. Equipment

1. MICROCOM 40 Transceiver
2. VHF-FM Signal Generator*
3. AC VTVM
4. DC Power Supply
5. DC VTVM or VOM
6. VOM - Simpson 360 (Digital)
7. Hex Tuning Tool
8. Small Blade Screwdriver
9. Small Blade Tuning Tool
10. 10.7 MHz Oscillator
11. Frequency Counter*
12. Sub-Audible Tone Generator
13. Tune-up Crystal
14. Audio Oscilloscope
15. 3.2Ω Speaker Load
16. Sinadder or Distortion Meter with 1000 Hz Band Elimination Filter.

* Can be replaced with Cushman or similar equipment.

B. Test Interconnection Diagram

Receiver Alignment



DRAWN MF / C. MC	DATE	SIZE A	PART NUMBER TP14-116	REV. E
APPROVED CJH	DATE 5-7-74			
DO NOT SCALE DWG.		SCALE ———		SHEET 8

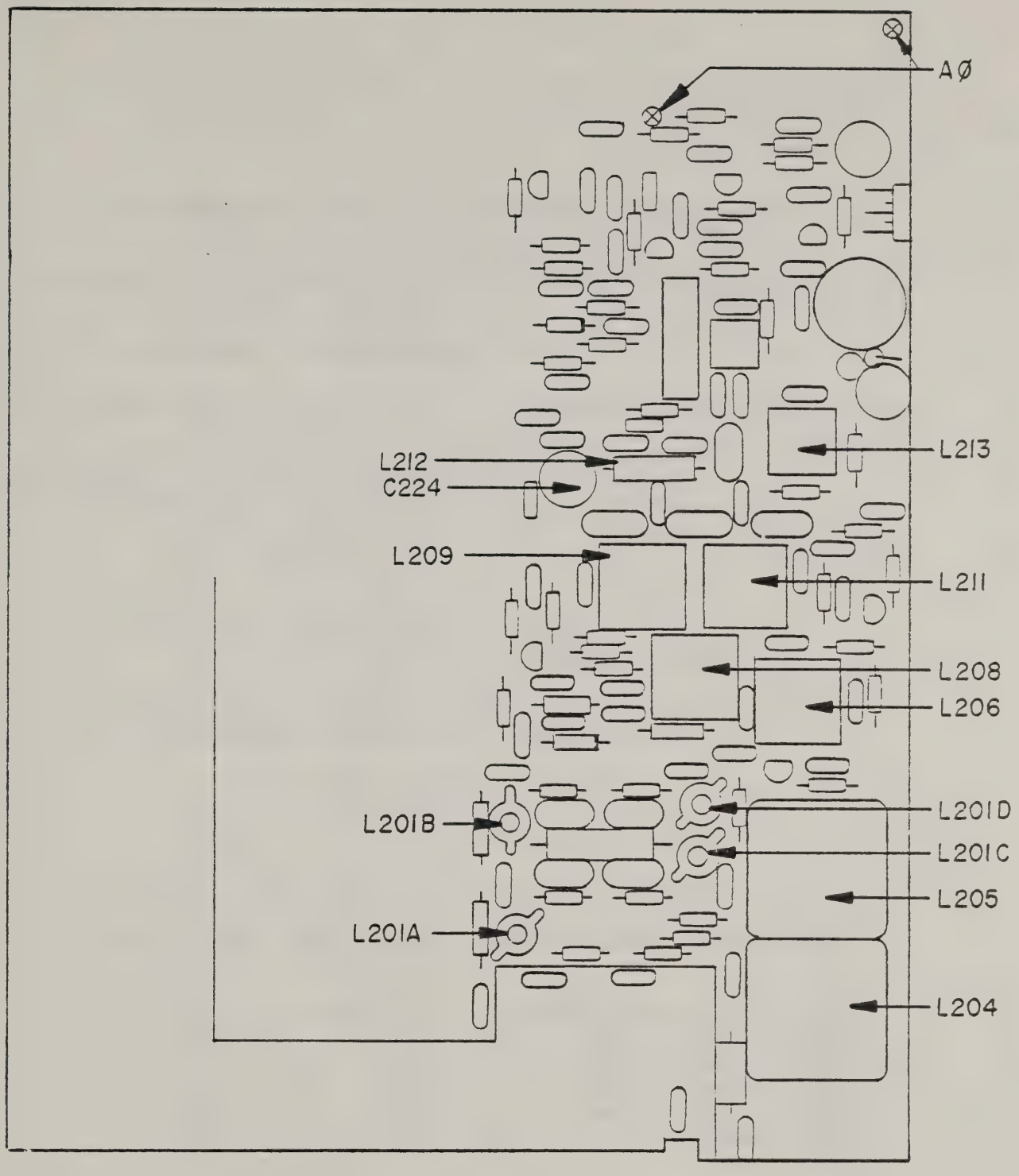


FIGURE 4

RECEIVER TUNING POINTS

DRAWN MF / C. MC	DATE	SIZE A	PART NUMBER TP14-116	REV. E
APPROVED	DATE			
DO NOT SCALE DWG.		SCALE		SHEET 9

II. Preset Conditions

A. Set DC Input Voltage at 13.8 VDC as measured on #6 DC VOM.

B. Insert center band tune-up crystal in F1 position (V201A).

Band	132-148 MHz	148-162 MHz	162-174 MHz
Crystal Freq.	140 MHz	155 MHz	168 MHz

C. Set VHF-FM Signal Generator #2 to center band tune-up crystal frequency measured on the Frequency Counter #9 and output attenuator to -130 dbm (zero output).

D. 1. Set squelch control (R402) fully CW.
2. On tone units, set tone monitor switch to monitor position, or unground microphone hangup button.

E. Set ON-OFF Volume Control (R403 to Off) fully CCW. In 4 channel models, set Channel Selector to F1.

F. Preset coil cores per following table.

Turns Measure From Top of Coil Form or Top of Can

Coil	Color	132-148 MHz	148-162 MHz	162-174 MHz
L204	Alu	8 Above	5 Above	8 Above
L205	Alu	8 Above	5 Above	8 Above
L206	Yel	12T	16T	16T
L208	Org	12T	20T	18T
L209	Grn	17T	16T	15T
L211	Wht	14T	14T	13T
L213	Blk	2T	2T	2T
L201 (ABCD)	Red	17T	17T	18T

* Set C224 so Silver Plate points toward L212.

This table indicates center band tune-up crystal presets. See Graph II, Figure 6 for other frequencies.

III. Tune-Up Procedure (Refer To Figure #1)

A. Connect AC VTVM (#3) across the speaker load and adjust the ON-OFF Volume Control for a readable output level on the audio output AC VTVM #3 on the 1V scale.

B. Connect DC VTVM (#5) between Aϕ and ground; and adjust L213 (detector coil) (Blk) for a 3.4 VDC on DC VTVM(#5) by feeding a strong 10.7 MHz signal into the area of L212 and C224*as indicated on the receiver tuning chart. Aϕ voltage should measure 3.4 VDC as indicated on the DC VTVM meter #5. Remove 10.7 MHz signal.

C. Increase the output of signal generator #2 set for 1 KHz tone and 3 KHz deviation. Observe meter #16 and increase signal generator output for 6 db sinad.

D. Adjust L204, L205, L206, L208, L209, L211, and C224*for best 12 db sinad. Constantly reduce signal generator #2 output for 12 db sinad on meter #16.

E. Remove modulation from signal generator #2 and set it to a level to produce a "beat note" with a 10.7 MHz signal coupled to L212. Warp L201A until the audio "beat note" frequency is zero. This warps the receiver on frequency.

F. Adjust signal generator #2 for 1 KHz tone modulation and 3 KHz deviation. Measure 12 db sinad on meter #16. The signal generator should read 0.25µv ±0.1µv.

G. Increase signal generator #2 to 1000µv and turn volume control R403 to full level. AC VTVM #3 should exceed 3.6V AC.

H. Remove modulation from signal generator #2 and set it to -130 dbm signal level. Set AC VTVM #3 to 1V scale and use volume control to set voltage on AC VTVM #3 to 1.0V AC. Increase signal generator #2 until AC VTVM #3 reads 0.1V AC. This 20 db quieting level should be less than 0.5µv and typically 0.4µv.

I. Reduce the output of signal generator #2 to -130 dbm and set squelch control R402 to threshold just quieting receiver noise. Increase signal generator level #2 until noise appears. This is threshold squelch level and should be less than 0.3µv.

J. Turn the squelch control R402 fully counter-clockwise and increase the signal generator level until squelch opens again. This is tight squelch and should be less than 1.0μv.

K. In 4 channel models repeat steps E and F for F2, F3, and F4 tuning L201B, L201C, and L201D correspondingly.

*Models built after Jan. 1979 will have C224 deleted.

IV. Table of Performance Limits

PARAMETER	MIN	TYP	MAX	UNITS
Aϕ	3.2	3.4	3.6	VDC
12 db Sinad		0.25	0.35	μv
20 dbq	---	0.35	0.5	μv
Threshold Squelch	---	0.20	0.30	μv
Tight Squelch	0.4	0.5	1.0	μv
Audio Output 1 KHz Tone 3 KHz Dev.	3.6	4.0	----	VAC
Noise Output	2.5	3.0	----	VAC

C. SPECIFICATIONS AND OTHER DATA PERTINENT TO MICROCOM H40

I. Specifications

a. Drawing #304-100
b. Drawing #304-106
c. Drawing #304-107
d. Drawing #304-108

APPLICATION			REVISIONS			
NEXT ASSY	USED ON		REV	DESCRIPTION	DATE	APPROVED
			A	R.D.C.	9/18	

REV. | SH. | DWG. NO. TP 14-140

TEST PROCEDURE - DOUBLE TUNED TEST PROCEDURE MICRO-COM H40 SERIES

This test procedure is required for transmitters with operating bandwidth greater than ±1.5 MHz.

Double tuned transmitter alignment

I. Test set-up

a. See TP 14-116

b. Test interconnection diagram. See Figure 1 TP 14-116.

II. Measurement Procedure

a. Compute best center frequency per drawing 304-106.

b. Set channel selector to best center frequency channel and tune per TP 14-116.

c. Connect DC VTVM(#2) between P2(+) and M3(-). Set VTVM(#2) to 5 volt scale.

d. Tune L315 for equal voltage at M3 for the lowest and highest frequencies. Voltage at M3 should exceed +1.25VDC for all channels.

e. Connect DC VTVM(#2) between P2(+) and M4 (-). Set VTVM (#2) to 5 volt scale.

f. Tune L308 for equal voltage at M4 for the highest and lowest frequencies. Voltage at M4 should exceed 1.0 VDC for all channels.

g. Connect DC VTVM (#2) between P2(+) and M5(-). Set VTVM (#2) to 2.5 volt scale.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCES ARE FRACT. ± DEC .XX± .XXX± ANG. ±	APPROVALS	DATE	Regency COMMUNICATIONS INC. SATELLITE BEACH, FLORIDA 32937		
	DRAWN		TP 14-140 Double Tuned Test Procedure Micro-Com H40 Series		
MATERIAL	CHECKED				
	DFTG. SUPV.				
FINISH	ENGR.				
	J. Hyson	9-18-75			
			SIZE A	PART NUMBER TP 14-140	REV. A
DO NOT SCALE DRWG.			SCALE		SHEET 1 OF 2

h. Tune L304 for equal voltage at M5 for highest and lowest frequencies. Voltage at M5 should exceed +.3VDC for all channels.

i. Refer to drawing 304-106 for performance degradation specifications.

DRAWN	DATE	SIZE	PART NUMBER	REV.
APPROVED	DATE	A	TP 14-140	
DO NOT SCALE DWG.		SCALE		SHEET

DWG NO. TP 14-140 SH. 1 REV. 1

SECTION 4 DIAGRAMS, VOLTAGE DATA AND SCHEMATICS

4-1 MAIN BOARD PARTS PLACEMENT (DWG.#704-015)

4-2 MAIN BOARD PARTS OVERLAY DIAGRAM (DWG.#704-014)

4-3 MAIN BOARD SCHEMATIC DIAGRAM (DWG.#704-023)

4-4 MAIN BOARD JUMPER DIAGRAM (DWG.#704-025)

4-5 P.A. BOARD PARTS OVERLAY DIAGRAM (DWG.#604-056)

4-6 P.A. BOARD PARTS PLACEMENT DIAGRAM (DWG.#604-057)

4-7 P.A. SCHEMATIC DIAGRAM (DWG.#604-058)

4-8 CONTROL BOARD PARTS OVERLAY DIAGRAM (DWG.#604-067)

4-9 CONTROL BOARD PARTS PLACEMENT DIAGRAM (DWG.#604-068)

4-10 CONTROL BOARD SCHEMATIC DIAGRAM (DWG.#604-059)

4-11 MAIN BOARD PARTS PLACEMENT/SILKSCREEN (DWG.#704-050)

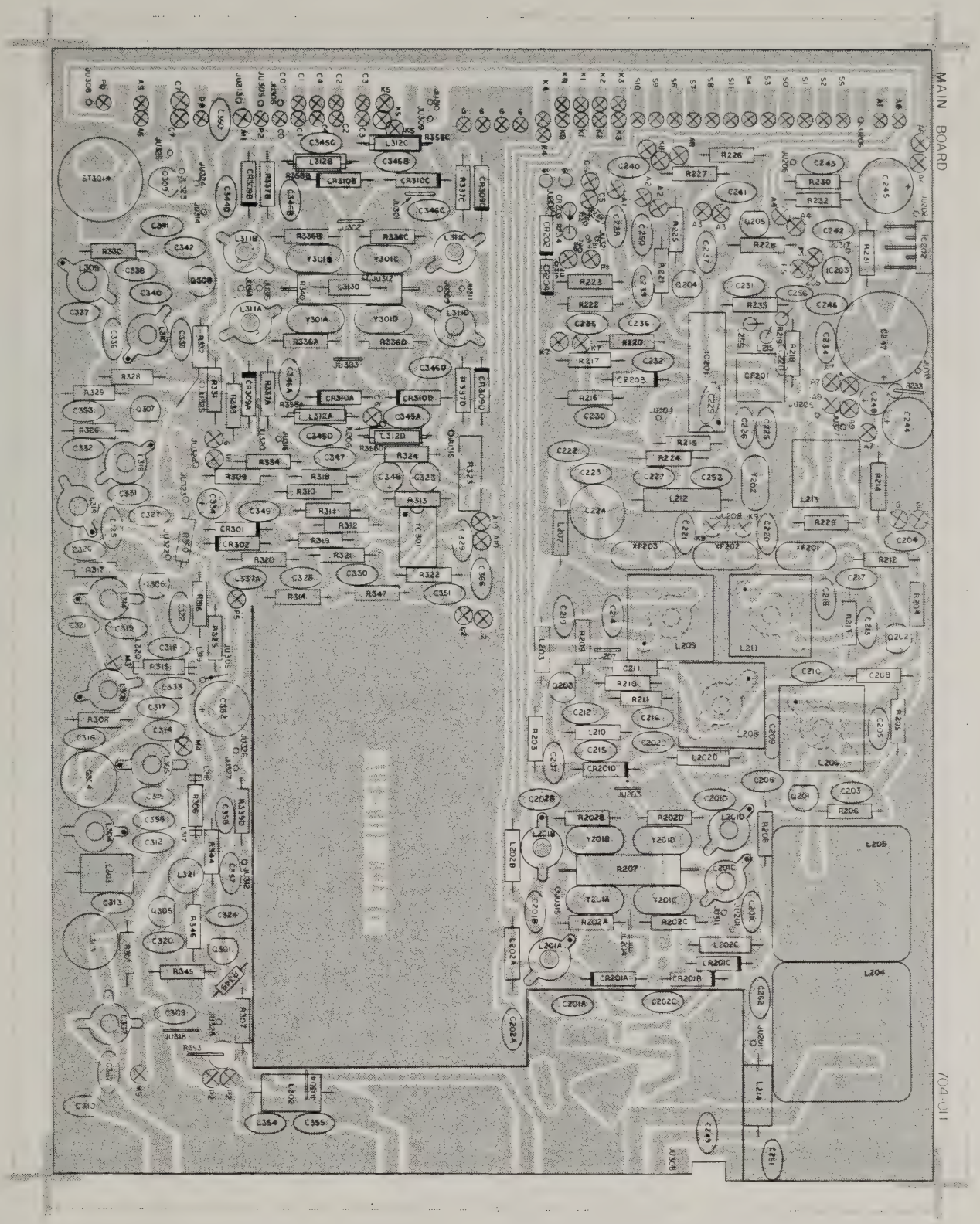
4-12 MAIN BOARD PARTS OVERLAY DIAGRAM (DWG.#704-052)

4-13 MAIN BOARD SCHEMATIC DIAGRAM (DWG.#704-056)

4-14 MAIN BOARD JUMPER DIAGRAM (DWG.#704-053)

4-15 VOLTAGE DATA (MAIN BOARD PRIOR TO 3/79)

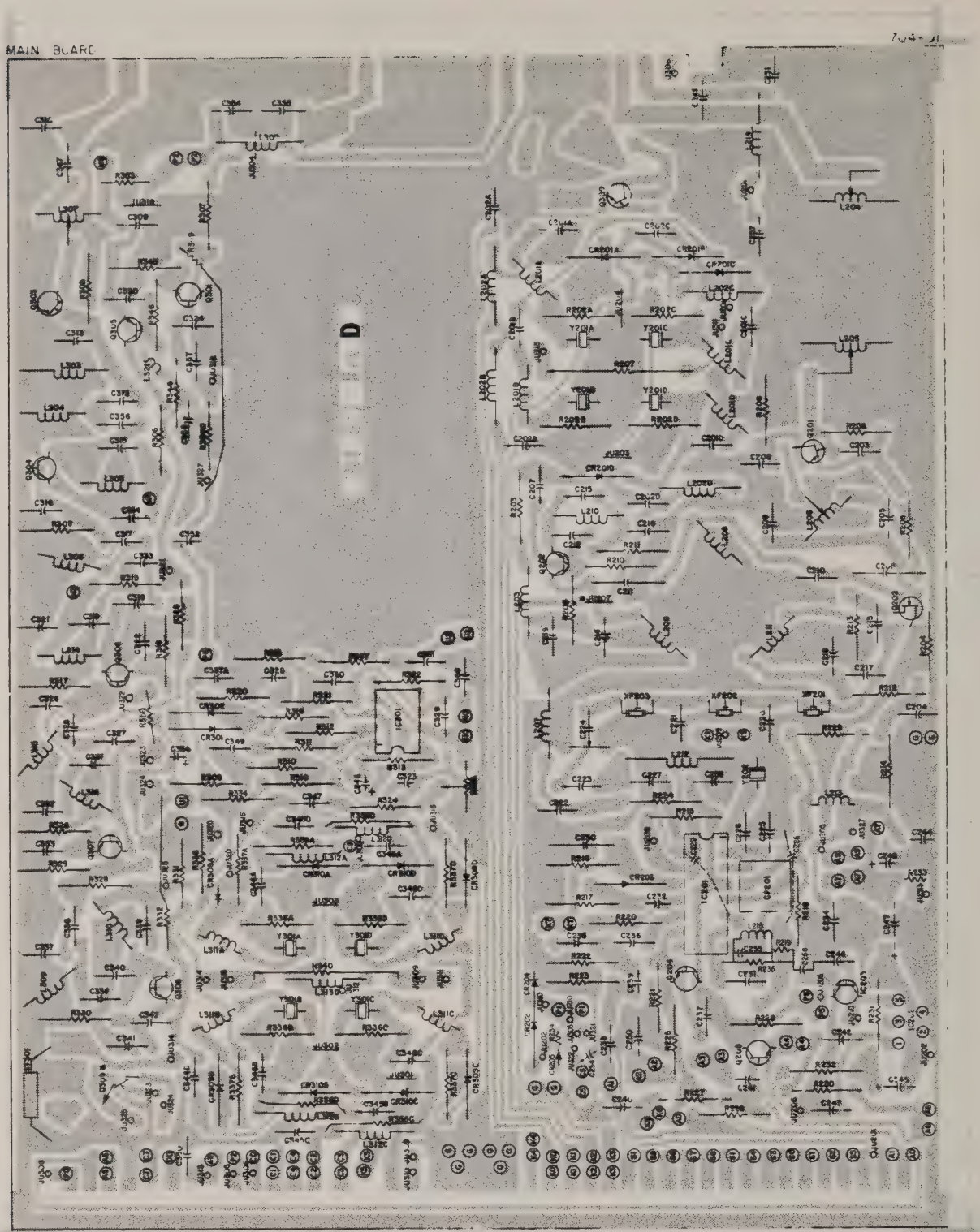
4-16 VOLTAGE DATA (MAIN BOARD AFTER 3/79)



704-015

PARTS PLACEMENT

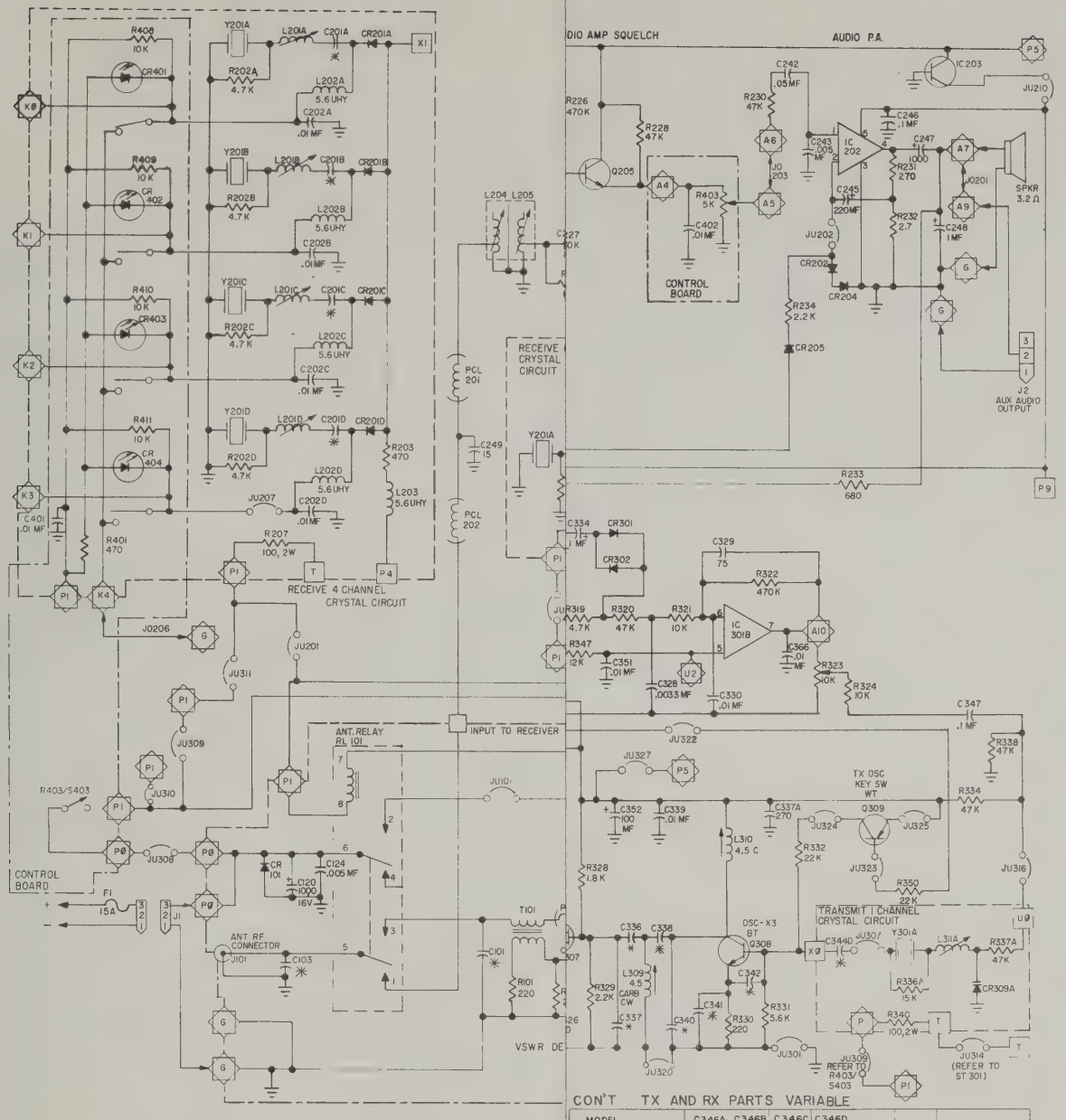
MCH 40



704-014

PARTS OVERLAY

MCH 40



CON'T TX AND RX PARTS VARIABLE

MODEL	C346A	C346B	C346C	C346D
MICRO COM H41A H44A	68	56	82	82
MICRO COM H41B H44B	56	47	68	68
MICRO COM H41C H44C	39	39	47	47

NOTES

1. ALL CAPACITOR VALUES NOT SPECIFIED OTHERWISE ARE PICO-FARAD
   ALL RESISTOR VALUES NOT SPECIFIED OTHERWISE ARE OHMS, 1/4 WATT
2. PARTS MARKED WITH * ARE VARIABLE WITH MODEL (SEE PARTS VARIABLE CHART)
3. PART NUMBERS INDICATE LOCATION
   - 0-99 CHASSIS MOUNTED PARTS
   - 100-199 P.A. DECK BOARD
   - 200-299 RECEIVER SECTION MAIN BOARD
   - 300-399 TRANSMITTER SECTION MAIN BOARD
   - 400-499 CONTROL PANEL BOARD
4. ⬡ DENOTES PIN LOCATED ON P.C. BOARD
   □ DENOTES CIRCUIT TIE POINT
   JU○ DENOTES SOLDERED IN JUMPERS
   JU● DENOTES HARDWIRED JUMPERS
   JU◀ DENOTES PLUGGED IN JUMPERS
   ——— INDICATES BOARD BOUNDARIES
   - - - INDICATES OPTION VARIATIONS
5. THIS SCHEMATIC IS USED IN CONJUNCTION WITH PC BOARD 704-011, 604-062, 604-051

C346	C338	C318	C356	C327
REF. CON'T	8.2	4.7	2.7	8.2
	6.8	3.9	2.2	6.8
	6.8	3.9	1.5	6.8

REV	CHANGE	DATE
K	EN AB-001 SJR	1-80
J	ENAA-709	5-7-79
H	EN AA 627	2-21-79
G	ENAA-588	1-16-79
F	ENAA-546	11-10-78
E	EN AA-482	10-10-78
D	ENAA-422	10-78
C	ENAA-377	8-78

REFERENCE MCH 40

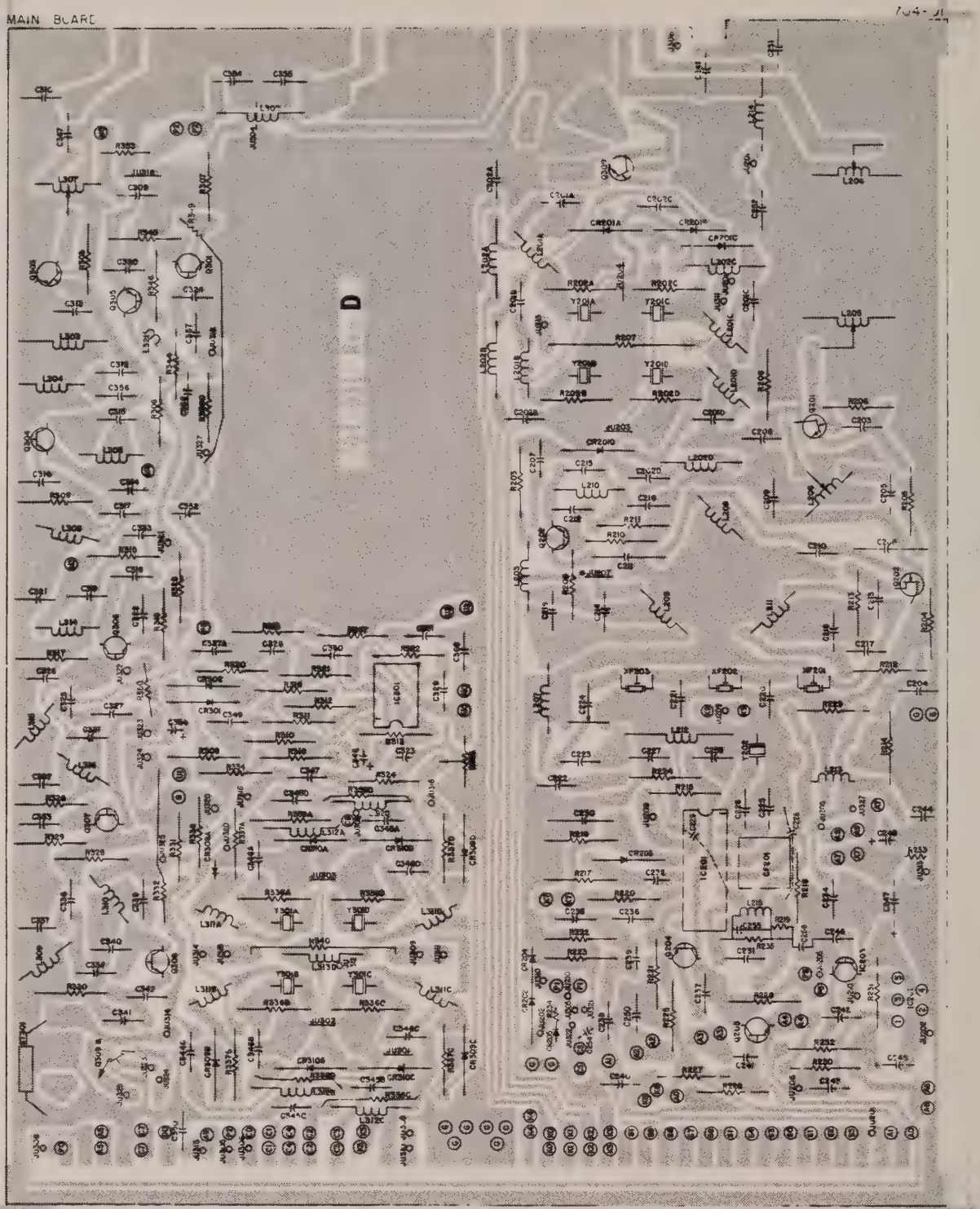
Regency ELECTRONICS INC INDIANAPOLIS INDIANA 46226

UNLESS OTHERWISE SPECIFIED: DEC ± — FRACT ± — ANGLES ± — SCREW THREADS AMERICAN NATIONAL CLASS —

SCALE — DRAWN CM-C 1-13-78 CHECKED

TITLE SCHEMATIC

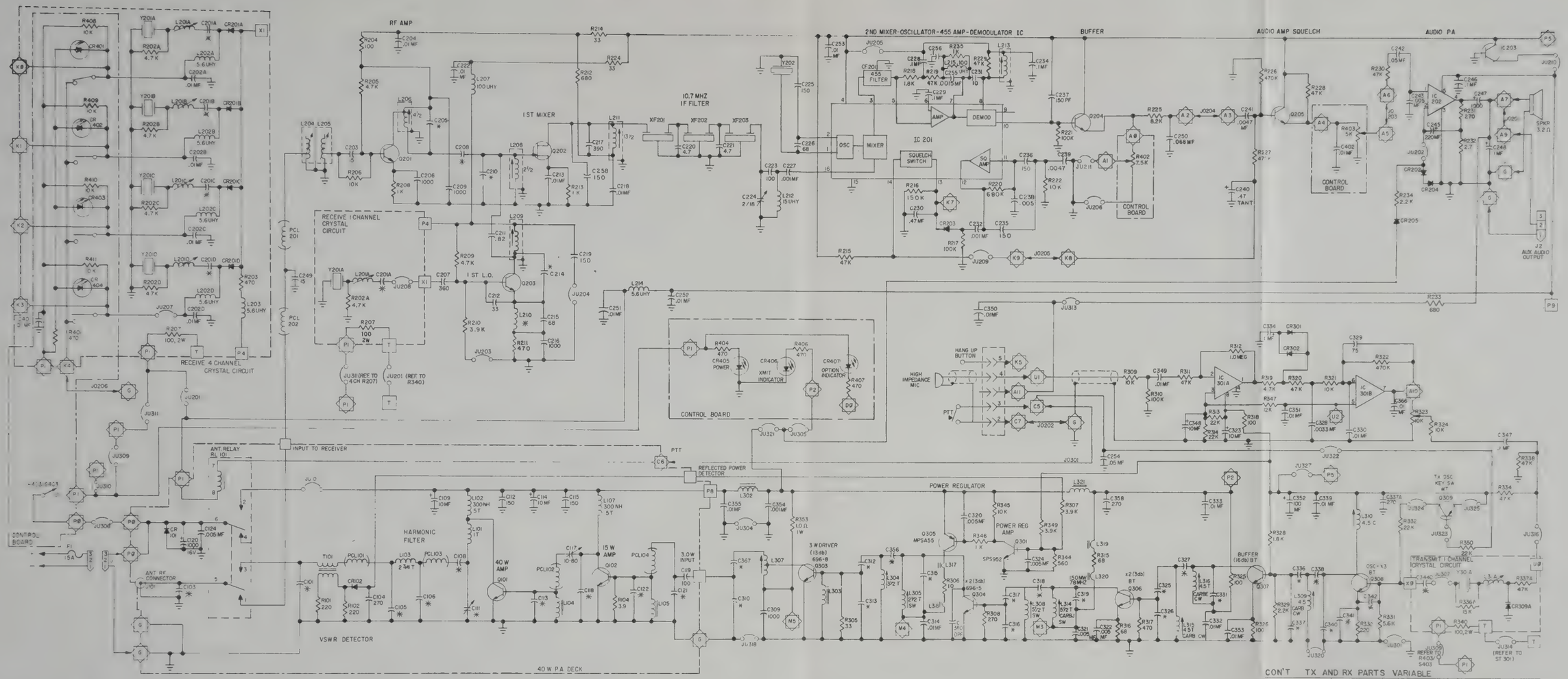
DRAWING NO 704-023 REV K

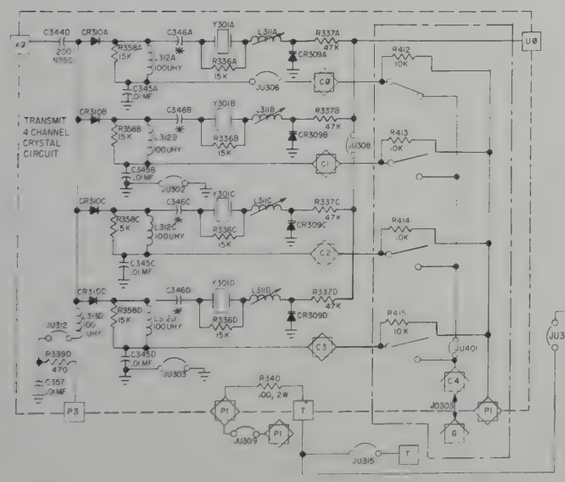


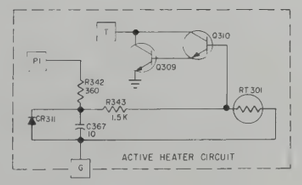
704-014

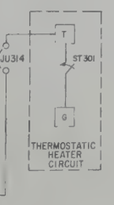
PARTS OVERLAY

MCH 40









PA PARTS VARIABLE

FREQ RANGE	C101	C103	C105	C106	C108	C111	C113	C118	C121	C122
132-148 MHZ	18	18	36	22	12	8-80	300	100	120	56
148-162 MHZ	15	15	33	18	10	6-60	250	68	75	47
162-174 MHZ	15	15	33	18	10	6-60	200	56	75	47

TX AND RX PARTS VARIABLE

MODEL	FREQ RANGE	C310	C312	C313	C315	C316	C317	C319	C325	C326	C331	C336	C337	C340	C367	C205	C214	C210	L204	L205	L210	C201	C208	C341	C342	C344D	C346	C338	C318	C356	C327
MICRO COM H41A H44A	132-148 MHZ	27	15	56	6.8	120	47	39	150	300	120	150	300	100	12	8.2	12	15	13½ T	13½ T	.47	10	1	150	150	39	REF CON'T	8.2	4.7	2.7	8.2
MICRO COM H41B H44B	148-162 MHZ	24	12	47	5.6	100	39	33	100	270	82	100	270	82	10	5.6	10	8.2	13 T	13 T	.27	8.2	.68	100	100	33		6.8	3.9	2.2	6.8
MICRO COM H41C H44C	162-174 MHZ	22	10	39	4.7	82	36	30	82	220	82	82	180	68	10	3.9	8.2	6.8	12½ T	12½ T	.27	5.6	.68	100	100	30		6.8	3.9	1.5	6.8

CON'T TX AND RX PARTS VARIABLE

MODEL	C346A	C346B	C346C	C346D
MICRO COM H41A H44A	68	56	82	82
MICRO COM H41B H44B	56	47	68	68
MICRO COM H41C H44C	39	39	47	47

REF DESIGNATIONS

LAST USED	NOT USED
R164, R235	C102, C107, C110,
R350	C116, C123, C233, C257
C124, C258	R103
C367	L104
Q102, Q205	C301, 302, 309, 305, 306
Q309	C307, 308, C313, C317,
CR102, CR205	C340, 341, 342, 343, 344, 345
CR311	R201, 223
LI07, L214,	R301, 302, 303, 304
L321	R351, 352, 343, 355
PCL104, 202	R358, R351, 352
TI01	
Y302, Y301	CR301, 304, 305,
IC203, 301	CR306, 307, 308
XF203	L301, L306
JU101, R21	JU317, JU319, JU326
JU327	

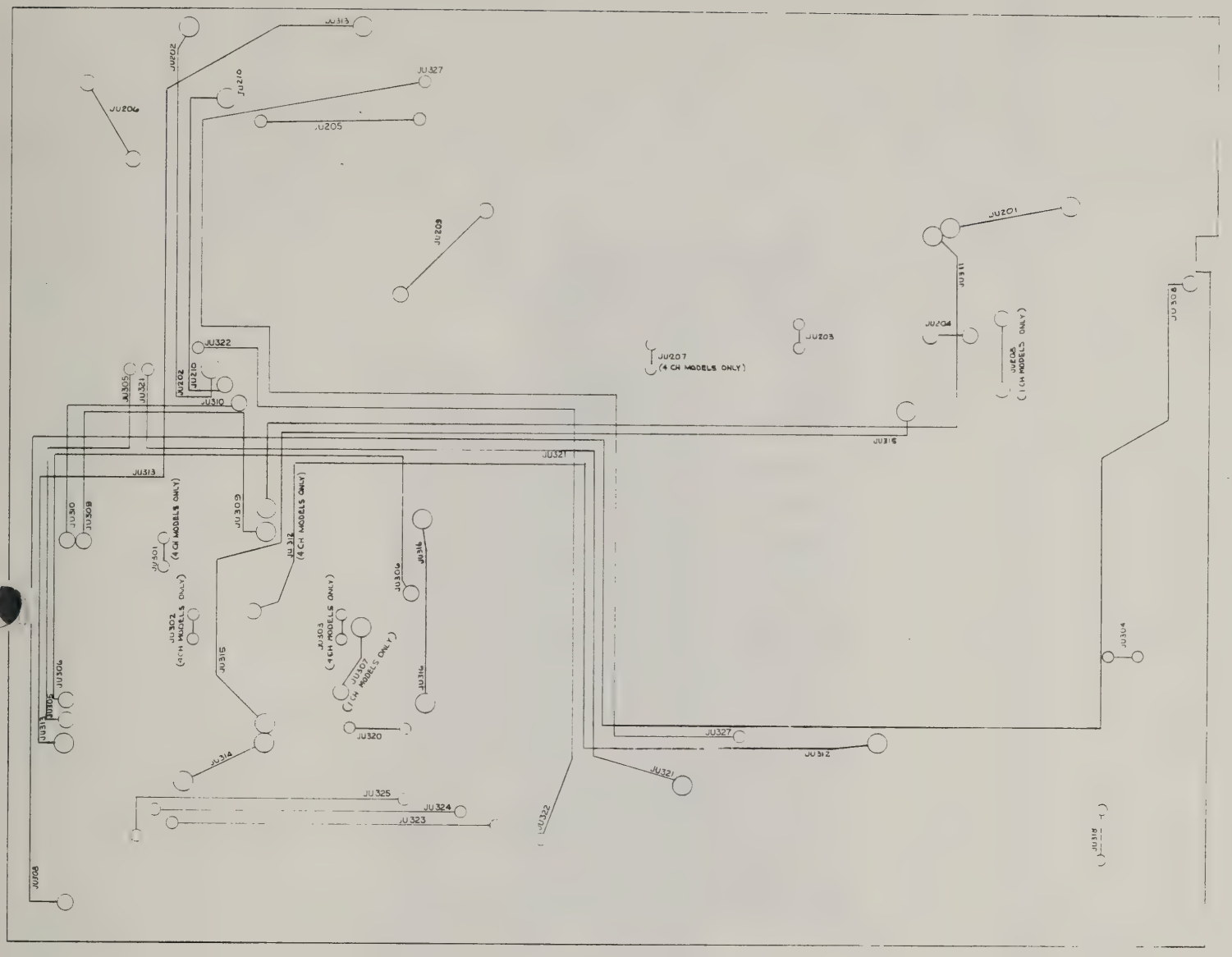
NOTES

1. ALL CAPACITOR VALUES NOT SPECIFIED OTHERWISE ARE PICO-FARAD. ALL RESISTOR VALUES NOT SPECIFIED OTHERWISE ARE OHMS, 1/4 WATT
2. PARTS MARKED WITH * ARE VARIABLE WITH MODEL (SEE PARTS VARIABLE CHART)
3. PART NUMBERS INDICATE LOCATION
   - 0-99 CHASSIS MOUNTED PARTS
   - 100-199 PA DECK BOARD
   - 200-299 RECEIVER SECTION MAIN BOARD
   - 300-399 TRANSMITTER SECTION MAIN BOARD
   - 400-499 CONTROL PANEL BOARD
4. ⬡ DENOTES PIN LOCATED ON P.C BOARD
   □ DENOTES CIRCUIT TIE POINT
   ○-30-○ DENOTES SOLDERED IN JUMPERS
   ○-●-○ DENOTES HARDWIRED JUMPERS
   ○-30-○ DENOTES PLUGGED IN JUMPERS
   ——— INDICATES BOARD BOUNDARIES
   - - - - INDICATES OPTION VARIATIONS
5. THIS SCHEMATIC IS USED IN CONJUNCTION WITH PC BOARD 704-011, 604-062, 604-051

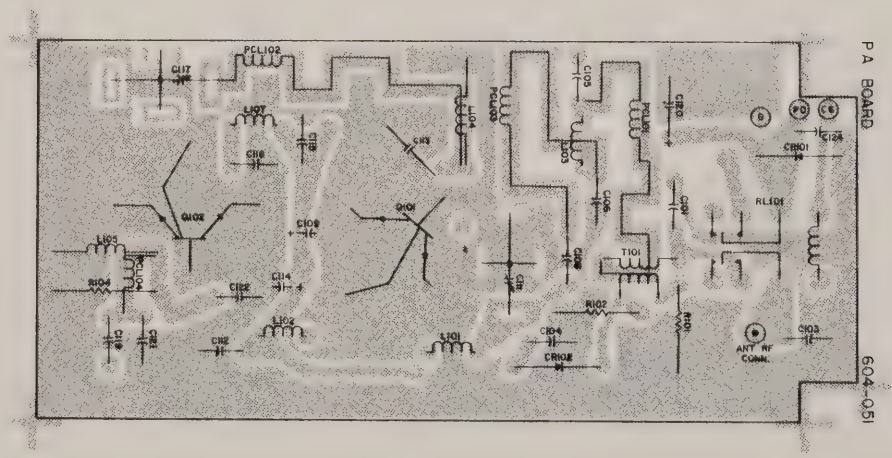
REV	CHANGE	DATE
K	IFN AR-101	
J	ENAA 708	
H	ENAA 627	
G	ENAA 586	
F	ENAA 546	
E	ENAA 482	
D	ENAA-422	
C		
B	ENAA 394	
A		

Research Electronics Inc. Indianapolis Indiana 46278

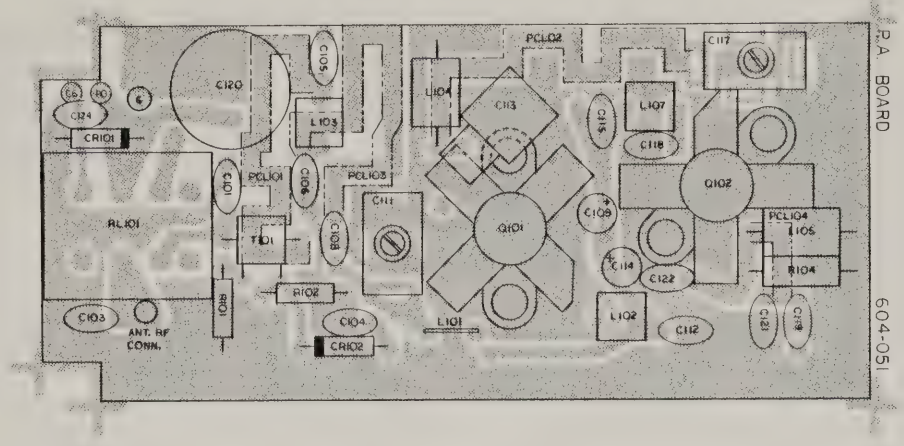
MCH 40 | CM2C 1-13-78 | SCHEMATIC | 704-023



704-025
JUMPER DIAGRAM
MCH 40



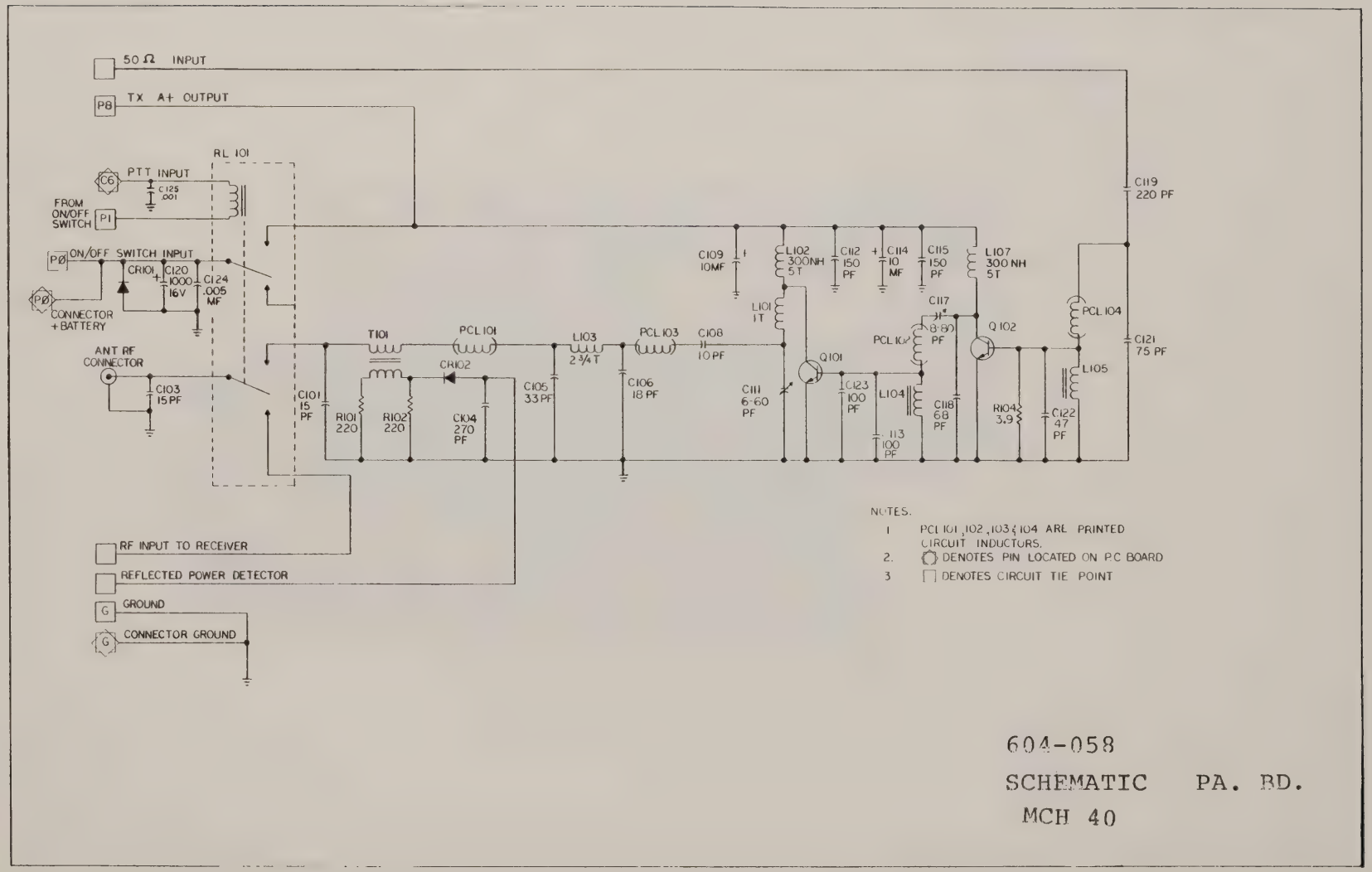
605-056
PARTS OVERLAY PA BD
MCH 40



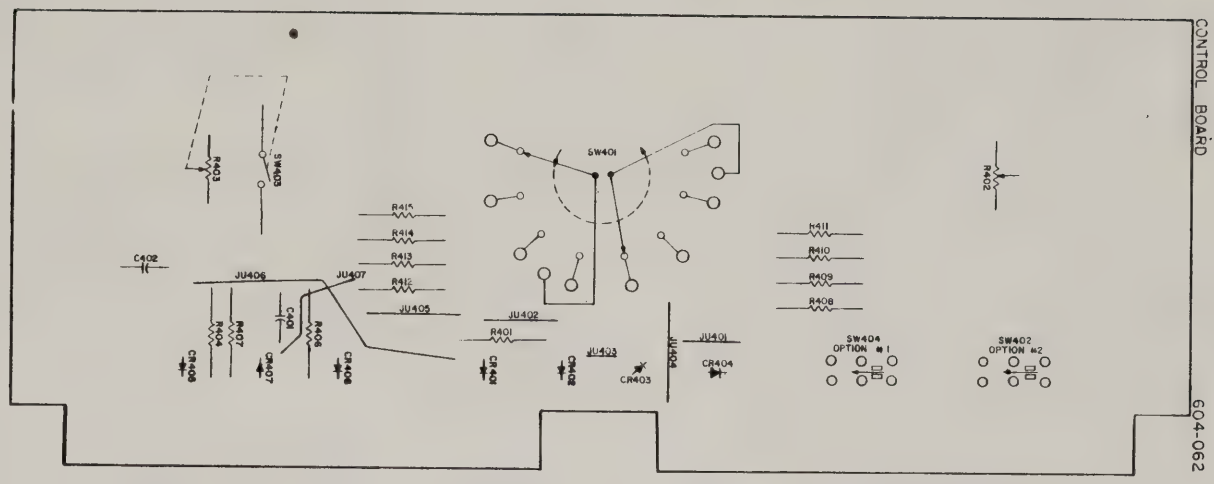
604-057

PARTS PLACEMENT PA BD

MCH 40



604-058
SCHEMATIC PA. BD.
MCH 40



NOTES

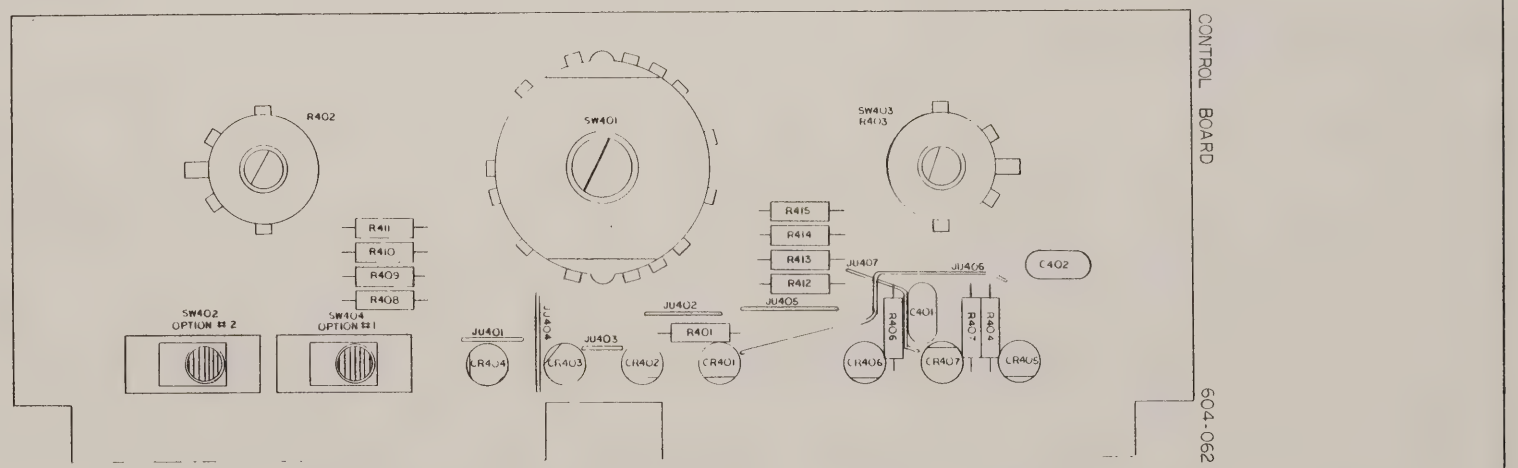
1 THE FOLLOWING PARTS ARE USED ON 4 CHANNE MODELS ... 14,15, CR401,2,3,4 AND JU401, 2, 3, 4

2 JU407 NOT REQUIRED ON MODELS MANUFACTURED AFTER JANUARY, ...

604-067

PARTS OVERLAY CONTROL BD.

MCH 40



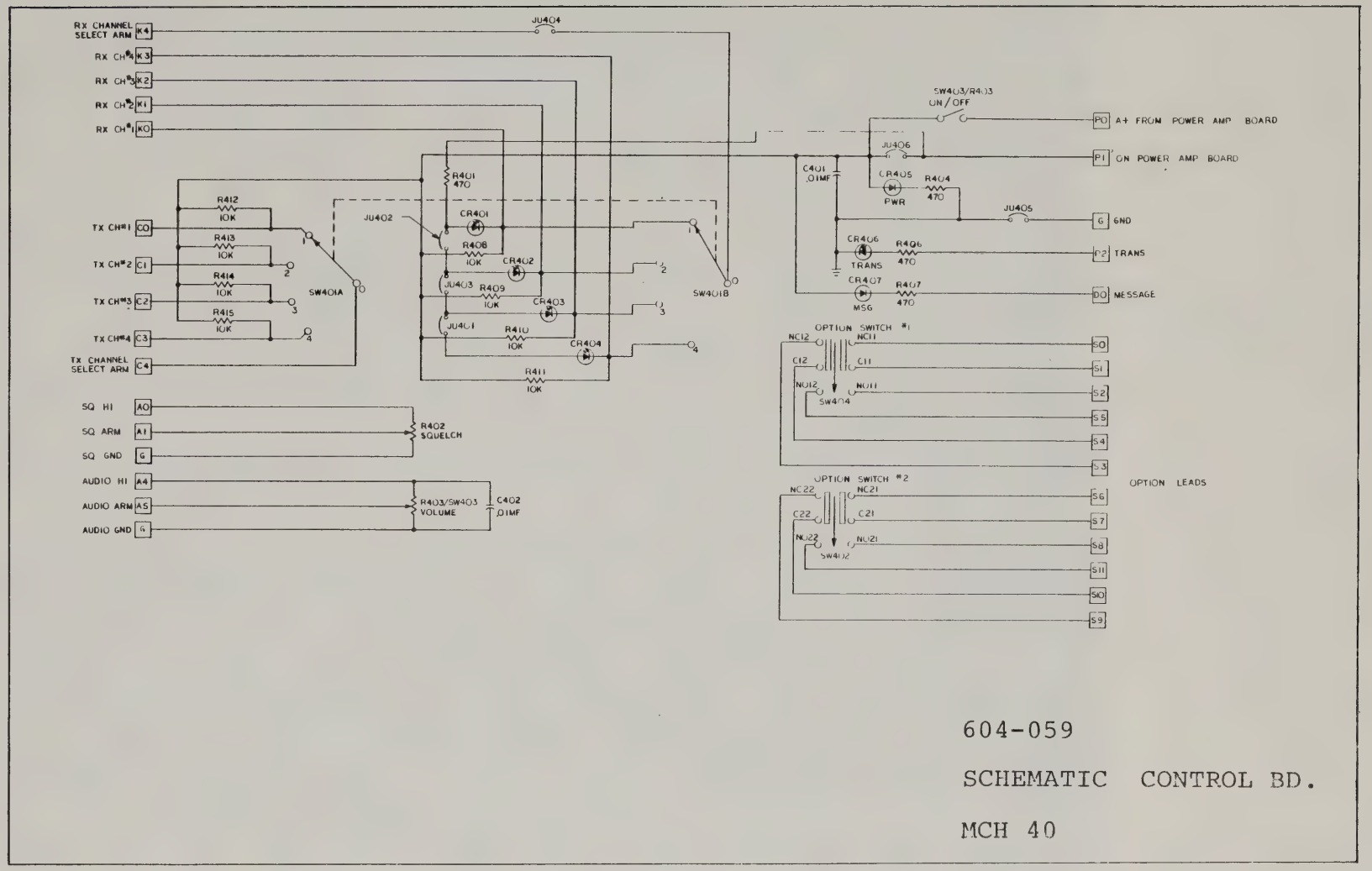
NOTES.

1. THE FOLLOWING PARTS ARE USED ON 4 CHANNEL MODELS ONLY. SW401, R401, 8, 9, 10, 11, 12, 13, 14, 15. CR401, 2, 3, 4 AND JU401, 2, 3, 4.
2. JU407 NOT REQUIRED ON MODELS MANUFACTURED AFTER JANUARY 1978

604-068

PARTS PLACEMENT CONTROL BD.

MCH 40

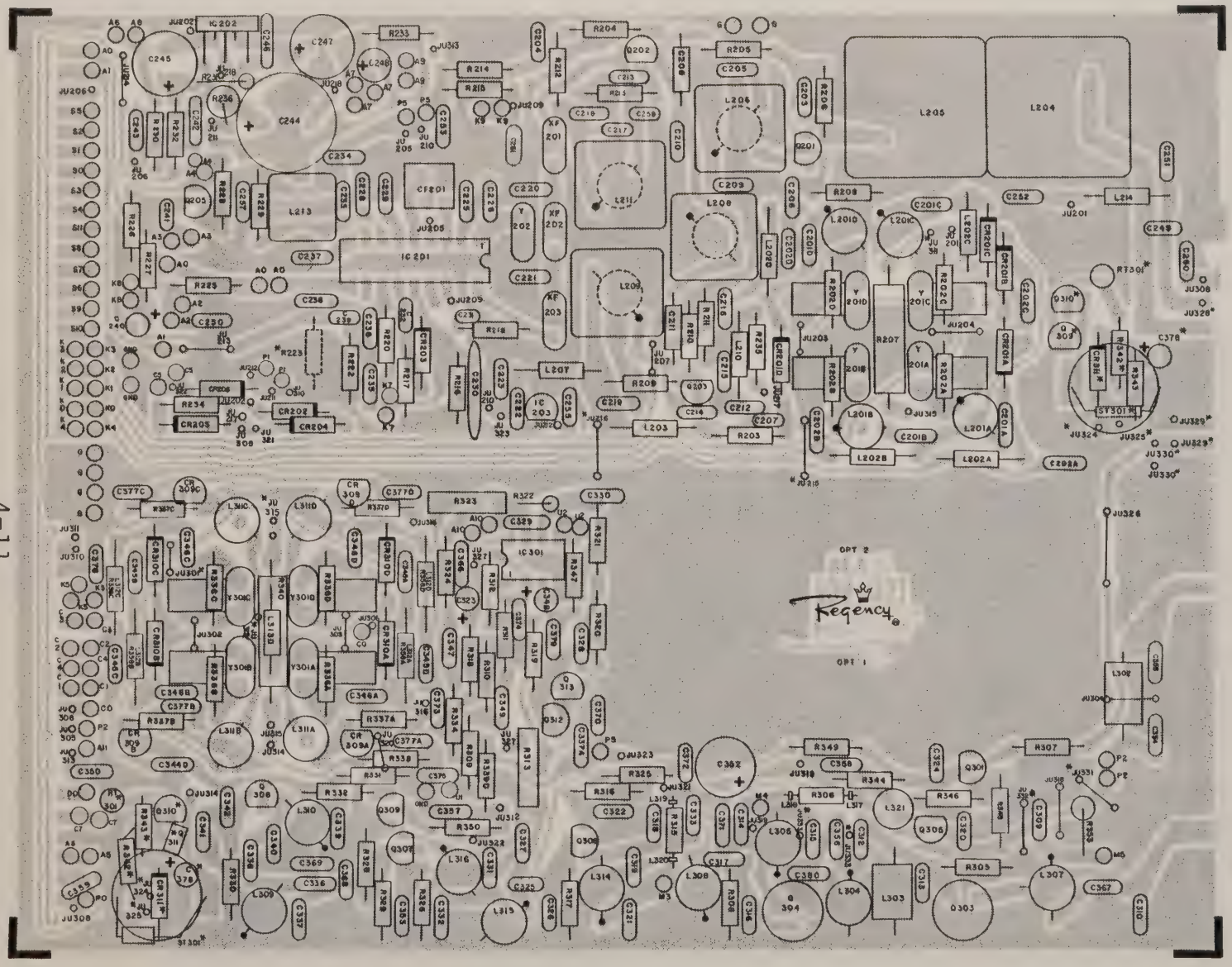


604-059

SCHEMATIC CONTROL BD.

MCH 40

ZONE	REV.	DESCRIPTION	DATE	APPROVED
	A	RELEASE R 062 WWL 9-25-76	10-3-76	C. MYSON
	C	ENAA 629 NEW DRAWING	03-19-79	
	D	ENAA 709 DB	05-14-79	
	D1	ENAA 789 DB	08-16-79	
	E	ENAA-813		
	F	ENAA 878 DB	09-28-79	
	G	ENAB-896		



704-050

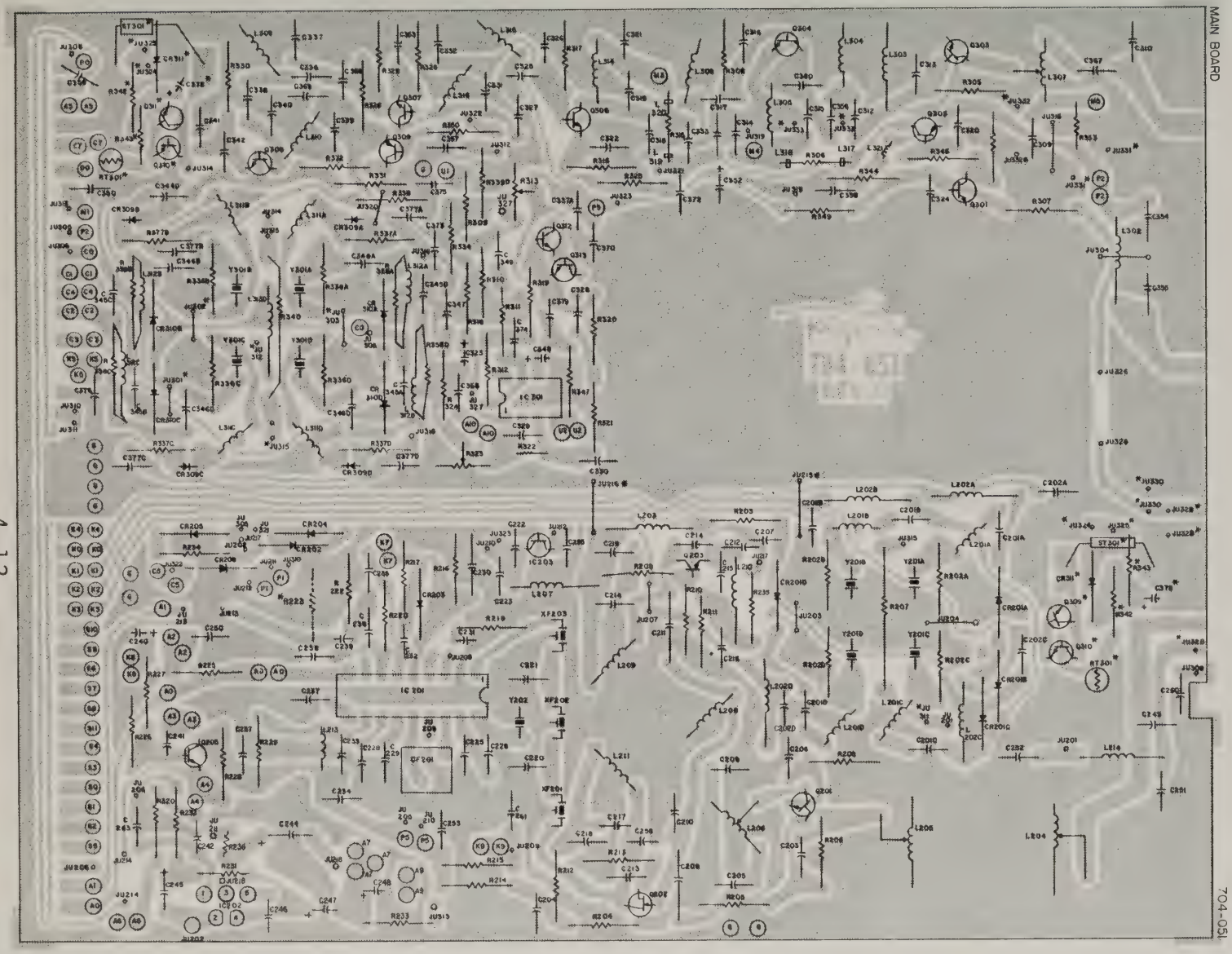
NOTE
* PARTS MAY BE ACTIVE OR PASSIVE CRYSTAL HEATER CIRCUITS AND WILL ALSO DEPEND ON MODEL

REDUCE TO 7.750 ± .003

4-11

NEXT ASSY	USED ON	APPROVALS	DATE	COMMUNICATIONS INC SATELLITE BEACH, FLORIDA 32937
APPLICATION	DO NOT SCALE DWG	DJB	5-79	PARTS PLACEMENT/SILKSCREEN MCH 40 II MAIN BOARD
	MCH 40			SIZE E 704-050 REV G
				SCALE 4/1 SHEET 1 OF 1

ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	RELEASED PER 062 WWL 9-21-78	10-3-78	C HYSON
	C	ENA[illegible] DRAWING	3-14-79	
	D	ENA[illegible] DB	5 4-79	
	E	ENA[illegible]	5 3 79	
	F	ENAB-076	CMSC	
	G	ENAB-166	CMSC	



NOTE
* PARTS MAY BE ACTIVE OR PASSIVE CRYSTAL HEATER CIRCUITS AND WILL ALSO DEPEND ON MODEL

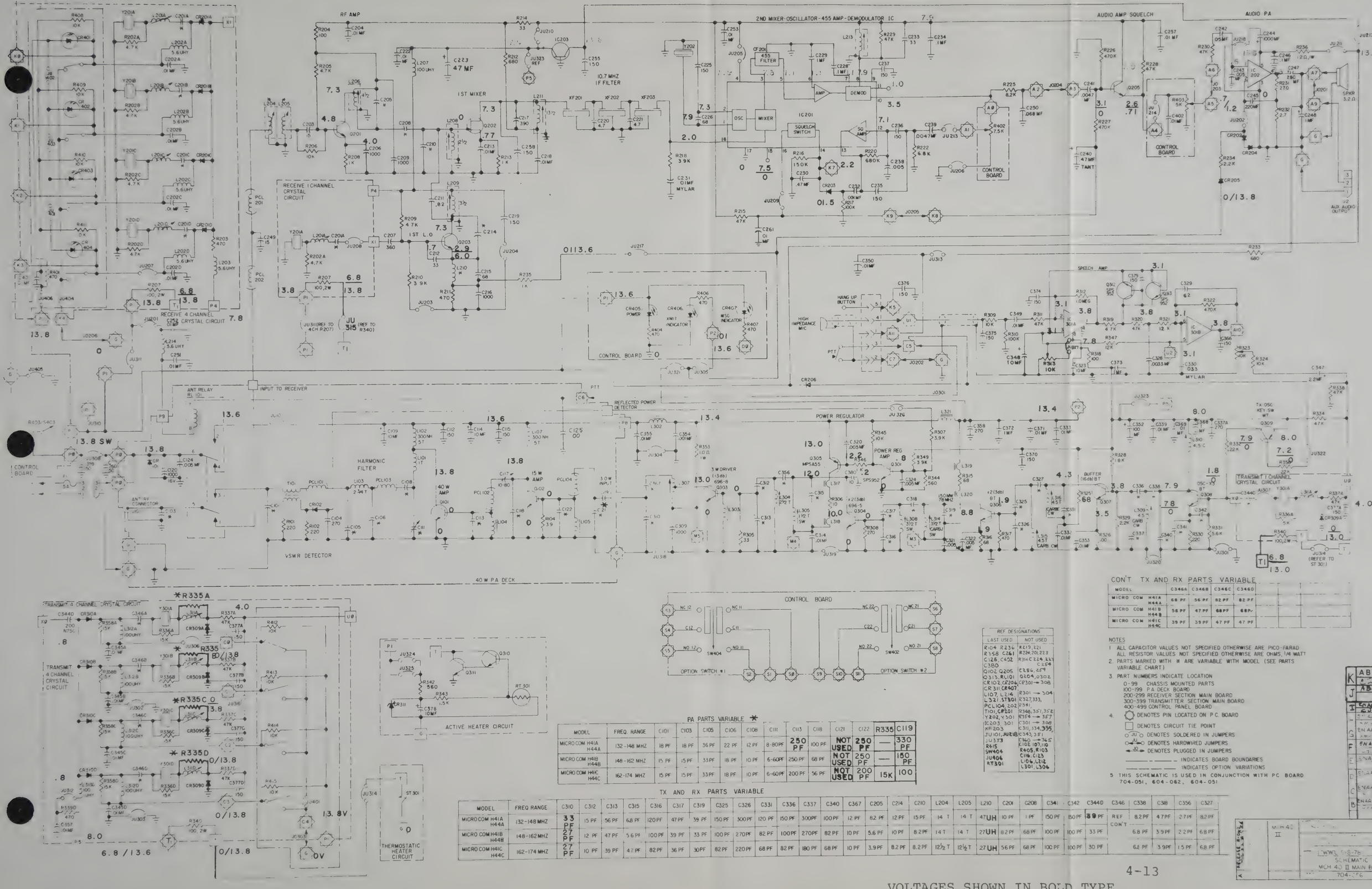
			APPROVALS	DATE	COMMUNICATIONS INC. SATELLITE BEACH, FLORIDA 32937
			DJB	3-14-79	
	MCH 40 II				PARTS OVERLAY MCH 40 II MAIN BOARD
NEXT ASSY	USED ON				SIZE E PART NUMBER 704-052 REV
APPLICATION		DO NOT SCALE DWG			SCALE 3/1 SHEET 1 OF 1

AUDIO AMP SQUELCH
AUDIO PA
RECEIVE 4 CHANNEL
RECEIVE 1 CHANNEL CRYSTAL CIRCUIT
CONTROL BOARD
SPEECH AMP
TRANSMIT 1 CHANNEL CRYSTAL CIRCUIT
TRANSMIT 4 CHANNEL CRYSTAL CIRCUIT
ANT. RELAY RL 101
INPUT TO RECEIVER
ANT RF CONNECTOR
VSWR DETECTOR
BUFFER (16db) B.T.
OSC-X3 BT
TX OSC KEY SW WT
MYLAR
SPKR 3.2 Ω
AUX AUDIO OUTPUT
CON'T TX AND RX PARTS VARIABLE
NOTES
1. ALL CAPACITOR VALUES NOT SPECIFIED OTHERWISE ARE PICO-FARAD ALL RESISTOR VALUES NOT SPECIFIED OTHERWISE ARE OHMS, 1/4 WATT
2. PARTS MARKED WITH * ARE VARIABLE WITH MODEL (SEE PARTS VARIABLE CHART)
3. PART NUMBERS INDICATE LOCATION
0-99 CHASSIS MOUNTED PARTS
100-199 PA DECK BOARD
200-299 RECEIVER SECTION MAIN BOARD
300-399 TRANSMITTER SECTION MAIN BOARD
400-499 CONTROL PANEL BOARD
4. DENOTES PIN LOCATED ON P.C. BOARD
DENOTES CIRCUIT TIE POINT
DENOTES SOLDERED IN JUMPERS
DENOTES HARDWIRED JUMPERS
DENOTES PLUGGED IN JUMPERS
INDICATES BOARD BOUNDARIES
INDICATES OPTION VARIATIONS
5. THIS SCHEMATIC IS USED IN CONJUNCTION WITH PC BOARD 704-051, 604-062, 604-051
AB 166-167
AB-013
MCH 40 II
SCHEMATIC MCH 40 II MAIN BOARD
704-056
4-13

MODEL	C346A	C346B	C346C	C346D
MICRO COM H41A H44A	68 PF	56 PF	82 PF	82 PF
MICRO COM H41B H44B	58 PF	47 PF	68 PF	68 PF
MICRO COM H41C H44C	39 PF	39 PF	47 PF	47 PF

C342	C344D	C346	C338	C318	C356	C327
50 PF	39 PF	REF CON'T	8.2 PF	4.7 PF	2.7 PF	8.2 PF
00 PF	33 PF		6.8 PF	3.9 PF	2.2 PF	6.8 PF
00 PF	30 PF		6.8 PF	3.9 PF	1.5 PF	6.8 PF

TYPE



CON'T TX AND RX PARTS VARIABLE

MODEL	C346A	C346B	C346C	C346D
MICRO COM H41A H44A	68 PF	56 PF	82 PF	82 PF
MICRO COM H41B H44B	56 PF	47 PF	68 PF	68 PF
MICRO COM H41C H44C	39 PF	39 PF	47 PF	47 PF

PA PARTS VARIABLE *

MODEL	FREQ. RANGE	C101	C103	C105	C106	C108	C111	C113	C118	C121	C122	R335	C119
MICRO COM H41A H44A	132-148 MHZ	18 PF	18 PF	36 PF	22 PF	12 PF	8-80PF	250 PF	100 PF	NOT USED	250 PF	—	330 PF
MICRO COM H41B H44B	148-162 MHZ	15 PF	15 PF	33 PF	18 PF	10 PF	6-60PF	250 PF	68 PF	NOT USED	250 PF	—	150 PF
MICRO COM H41C H44C	162-174 MHZ	15 PF	15 PF	33 PF	18 PF	10 PF	6-60PF	200 PF	56 PF	NOT USED	200 PF	15K	100

TX AND RX PARTS VARIABLE

MODEL	FREQ. RANGE	C310	C312	C313	C315	C316	C317	C319	C325	C326	C331	C336	C337	C340	C367	C205	C214	C210	L204	L205	L210	C201	C208	C341	C342	C344D	C346	C338	C348	C356	C327
MICRO COM H41A H44A	132-148 MHZ	33 PF	15 PF	56 PF	68 PF	120 PF	47 PF	39 PF	150 PF	300 PF	120 PF	150 PF	300PF	100 PF	12 PF	82 PF	12 PF	15 PF	14 T	14 T	47UH	10 PF	1 PF	150 PF	150 PF	39 PF	REF CON'T	8.2 PF	4.7 PF	2.7 PF	8.2 PF
MICRO COM H41B H44B	148-162 MHZ	27 PF	12 PF	47 PF	5.6 PF	100 PF	39 PF	33 PF	100 PF	270 PF	82 PF	100 PF	270PF	82 PF	10 PF	5.6 PF	10 PF	8.2 PF	14 T	14 T	27UH	8.2 PF	68 PF	100 PF	100 PF	33 PF		6.8 PF	3.9 PF	2.2 PF	6.8 PF
MICRO COM H41C H44C	162-174 MHZ	27 PF	10 PF	39 PF	4.7 PF	82 PF	36 PF	30PF	82 PF	220 PF	68 PF	82 PF	180 PF	68 PF	10 PF	3.9 PF	8.2 PF	8.2 PF	12½ T	12½ T	27UH	5.6 PF	68 PF	100 PF	100 PF	30 PF		6.8 PF	3.9 PF	1.5 PF	6.8 PF

REF DESIGNATIONS

LAST USED	NOT USED
R104 R236 R358 C261 C126, C452 C380 Q102, Q205 Q313, RL101 CR102, CR206 CR311 CR407 L107, L214 L321, ST301 PCL104, 202 T101, CR201 Y202, Y301 IC203, 301 XF203 JU101, JU313 JU373 R415 SW404 JU406 RT301	R219, 321 R224, 201, 223 R314 C224, 227 C264 C256, 259 Q204, 302 CR301 → 308 R301 → 304 R327, 333, R341 R346, 351, 352 R354 → 357 C301 → 308 C311, 334, 355, IC343, 351 R360 → 365 R102, 107, 110 R405, R103 C116, C123 L106, L212 L301, L304

NOTES

1. ALL CAPACITOR VALUES NOT SPECIFIED OTHERWISE ARE PICO-FARAD
   ALL RESISTOR VALUES NOT SPECIFIED OTHERWISE ARE OHMS, 1/4 WATT
2. PARTS MARKED WITH * ARE VARIABLE WITH MODEL (SEE PARTS VARIABLE CHART)
3. PART NUMBERS INDICATE LOCATION
   0-99 CHASSIS MOUNTED PARTS
   100-199 P.A. DECK BOARD
   200-299 RECEIVER SECTION MAIN BOARD
   300-399 TRANSMITTER SECTION MAIN BOARD
   400-499 CONTROL PANEL BOARD
4. ⬡ DENOTES PIN LOCATED ON P.C. BOARD
   □ DENOTES CIRCUIT TIE POINT
   JU DENOTES SOLDERED IN JUMPERS
   DENOTES HARDWIRED JUMPERS
   J2 P2 DENOTES PLUGGED IN JUMPERS
   ——— INDICATES BOARD BOUNDARIES
   - - - - INDICATES OPTION VARIATIONS
5. THIS SCHEMATIC IS USED IN CONJUNCTION WITH P.C. BOARD 704-051, 604-062, 604-051

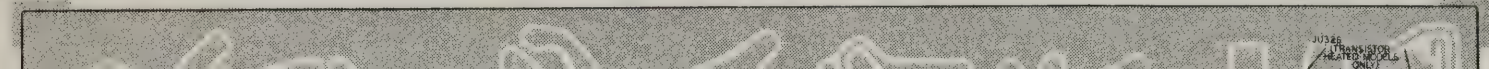
K	AB 166-167
J	AB013

MICRO COM II

WWL 5-8-76

SCHEMATIC MCH 40 II MAIN BOARD 704-076 K

VOLTAGES SHOWN IN BOLD TYPE



REVISIONS

ZONE		DESCRIPTION		DATE	APPROVED
	A	RELEASE R-062	9-26-78	10/24/78	C H
	B	ENAA	DJB 3-20-79	03-20 79	CJH
	C	ENAA	DJB 5 5 79	05-05 79	"
	D	EN	[illegible] 79	[illegible]	"
	F	EN	CMC	[illegible]	CLP

JU346
TRANSISTOR HEATED MODELS ONLY

4-15 VOLTAGE DATA
MAIN BOARD (prior to 3/79)

NOTE: All voltages are nominal and were measured with a VTVM, 13.8 VDC supply voltage.

VOLTAGE DATA - TRANSISTORS

	Transistor	Emitter (Source)	Base (Gate)	Collector (Drain)
RECEIVER MAIN BD.	Q201	4.0	4.8	7.3
	Q202	.77	Ø	7.3
	Q203	4.9	1.7	7.3
	Q204	2.9	3.4	7.9
	Q205	2.6	3.1	7.9 (Unsquelched)
		.71	Ø	7.9 (Squelched)
		.71	Ø	7.9 min.(tight squelch)
TRANSMITTER P.A. DECK	Q101	Ø	Ø	13.8
	Q102	Ø	Ø	13.8
TRANSMITTER MAIN BD.	Q301	Ø	.80	.20
	Q303	Ø	Ø	13.0
	Q306	1.9	8.7	8.8
	Q307	3.5	3.8	4.3
	Q308 (keyed)	.78	1.8	7.9
	(unkeyed)	Ø	Ø	7.9
	Q309 (keyed)	7.9	7.2	7.9
	(unkeyed)	7.9	13.7	Ø

VOLTAGE DATA - INTEGRATED CIRCUITS

IC NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
IC201	7.9	7.3	7.5	7.9	1.1	1.1	1.1	7.9	N/C	3.5	2.1	2.2	.5/0	0/7.5	Ø	2.0
IC202	.6	.7	Ø	6.8	13.7	-	-	-	-	-	-	-	-	-	-	-
IC203	13.7	Ø	7.9	-	-	-	-	-	-	-	-	-	-	-	-	-
IC301	3.0	3.1	3.1	Ø	3.1	3.1	3.2	7.8	-	-	-	-	-	-	-	-

4-16 VOLTAGE DATA
MAIN BOARD (after 3/79)

NOTE: All voltages are nominal and were measured with a VTVM, 13.8 VDC supply voltage.

VOLTAGE DATA - TRANSISTORS

	Transistor		Emitter (Source)	Base (Gate)	Collector (Drain)
RECEIVER MAIN BD.	Q201		4.0	4.8	7.3
	Q202		.77	Ø	7.3
	Q203		2.9	1.7	7.3
	Q205		2.6	3.1	7.9 (Unsquelched)
			.71	Ø	7.9 (Squelched)
			.71	Ø	7.9 min.(tight squelch)
TRANSMITTER P.A. DECK	Q101		Ø	Ø	13.8
	Q102		Ø	Ø	13.8
TRANSMITTER MAIN BD.	Q301		Ø	.80	.20
	Q303		Ø	Ø	13.0
	Q306		1.9	1.7	8.8
	Q307		3.5	3.8	4.3
	Q308	(keyed)	.78	1.8	7.9
		(unkeyed)	Ø	Ø	7.9
	Q309	(keyed)	7.9	7.2	7.9
		(unkeyed)	7.9	13.7	Ø
	Q305		13.0	12.2	12.0
	Q304		0	0	10.0

VOLTAGE DATA - INTEGRATED CIRCUITS

IC NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
IC201	7.9	7.3	7.5	7.9	1.1	1.1	1.1	7.9	1.0	3.5	N/C	7.1	2.2	0/.5	N/C	7.5/0	0	2.0
IC202	.6	.7	Ø	6.8	13.7	-	-	-	-	-	-	-	-		-	-		
IC203	13.7	Ø	7.9	-	-	-	-	-	-	-	-	-	-		-	-		
IC301	3.0	3.1	3.1	Ø	3.1	3.1	3.2	7.8	-	-	-	-	-		-	-		

SECTION 5 PARTS LIST

5-1 PARTS LIST PA BOARD

LOCATION	DESCRIPTION	PART NO.
RESISTORS (All resistors are 5% ½W unless otherwise noted)		
R101	220 ohm	4704-0221-032
R102	220 ohm	4704-0221-032
R103	not used	
R104	3.9 ohm ½W 5%	4704-0399-034
CAPACITORS		
C101 (Range A)	18 pf	1504-0180-505
C101 (Range B)	15 pf	1504-0150-505
C101 (Range C)	15 pf	1504-0150-505
C102	not used	
C103 (Range A)	18 pf	1504-0180-505
C103 (Range B)	15 pf	1504-0150-505
C103 (Range C)	15 pf	1504-0150-505
C104	270 pf	1504-0271-505
C105 (Range A)	36 pf	1504-0360-505
C105 (Range B)	33 pf	1504-0330-505
C105 (Range C)	33 pf	1504-0330-505
C106 (Range A)	22 pf	1504-0220-505
C106 (Range B)	18 pf	1504-0180-505
C106 (Range C)	18 pf	1504-0180-505
C107	not used	
C108 (Range A)	12 pf	1504-0120-505
C108 (Range B)	10 pf	1504-0100-505
C108 (Range C)	10 pf	1504-0100-505
C109	10 mf	1513-0100-006
C110	not used	
C111 (Range A)	10-80 pf	1517-0000-040
C111 (Range B)	4-60 pf	1517-0000-002
C111 (Range C)	4-60 pf	1517-0000-002
C112	150 pf	1523-0151-002
C113 (Range A)	250 pf	1522-0251-001
C113 (Range B)	250 pf	1522-0251-001
C113 (Range C)	200 pf	1522-0201-001
C114	10 mf	1513-0100-006
C115	150 pf	1523-0151-002
C116	not used	
C117	10-80 pf	1517-0000-040
C118 (Range A)	100 pf	1504-0101-505
C118 (Range B)	68 pf	1504-0680-505
C118 (Range C)	56 pf	1504-0560-505
C119 (Range A)	270 pf	1539-0271-401
C119 (Range B)	150 pf	1539-0151-601
C119 (Range C)	100 pf	1539-0101-601
C120	1000 mf	1513-0102-002
C121	not used	
C122 (Range A)	250 pf	1522-0251-001
C122 (Range B)	250 pf	1522-0251-001
C122 (Range C)	200 pf	1522-0201-001
C123	not used	
C124	.005 mf	1503-0502-005
C125	.001 mf	1523-0102-002

LOCATION	DESCRIPTION	PART NO.
COILS		
L101	coil	1801-3247-401
L102	choke	1803-3269-000
L103	coil 2½T	1801-3407-702
L104	ferroxcube	2502-0000-002
L105	ferroxcube	2502-0000-002
L106	not used	
L107	choke	1803-3269-000
T101	coil transformer	1800-1314-300
DIODES		
CR101	silicon IN4002	4806-0000-004
CR102	silicon IN4148	4805-1241-200
RELAY		
RL101	1335P Guardian	4500-3251-900
TRANSISTORS		
Q101	RF Power	4804-3170-903
Q102	RF Power	4804-3170-902

5-2 PARTS LIST CONTROL BOARD

RESISTORS (All resistors are 5% ¼W unless otherwise noted)

R401	470 ohm ¼W 10%	4700-0471-042	44 only
R402	7.5K variable	4750-3406-402	
R403	5K variable	4750-3406-401	
R404	470 ohm ¼W 10%	4700-0471-042	41 only
R405	not used		
R406	470 ohm ¼W 10%	4700-0471-042	41 only
R407	470 ohm ¼W 10%	4700-0471-042	41 only
R408	10K ¼W 10%	4700-0103-042	44 only
R409	10K ¼W 10%	4700-0103-042	44 only
R410	10K ¼W 10%	4700-0103-042	44 only
R411	10K ¼W 10%	4700-0103-042	44 only
R412	10K ¼W 10%	4700-0103-042	44 only
R413	10K ¼W 10%	4700-0103-042	44 only
R414	10K ¼W 10%	4700-0103-042	44 only
R415	10K ¼W 10%	4700-0103-042	44 only
CAPACITORS			
C401	.01 mf	1538-0103-804	41 only
C402	.01 mf	1538-0103-804	41 only

LOCATION	DESCRIPTION	PART NO.	
DIODES			
CR401	Led Red	4810-1282-900	
CR402	Led Red	4810-1282-900	
CR403	Led Red	4810-1282-900	
CR404	Led Red	4810-1282-900	
CR405	Led Red	4810-1282-900	
CR406	Led Red	4810-1282-900	
CR407	Led Red	4810-1282-900	
SWITCHES			
SW401	Rotary	5111-5411-001	44 only
SW402	slide option	5113-5136-001	
SW403/R403	switch off/on/vol	4750-3415-301	
SW404	slide option	5113-5136-001	

LOCATION	DESCRIPTION	PART NO.	
RESISTORS (All resistors are 5 % ¼W unless otherwise noted)			
R201	not used		
R202A	4.7K res comp (only) ¼W 10%	4700-0472-042	
R202B,C,D	4.7K res comp (only) ¼W 10%	4700-0472-042	(4 ch)
R203	470 ohm	4704-0471-032	(4 ch)
R204	100 ohm	4704-0101-032	
R205	4.7K	4704-0472-032	
R206	10K ohm	4704-0103-032	
R207	wire wound 100 ohm 2W 5%	4707-0101-031	
R208	1K ohm	4704-0102-032	
R209	4.7K	4704-0472-032	
R210	3.9K	4704-0392-032	
R211	470 ohm	4704-0471-032	
R212	680 ohm	4704-0681-032	
R213	1K ohm	4704-0102-032	
R214	33 ohm	4704-0330-032	
R215	47K	4704-0473-032	
R216	150K ohm 5%	4704-0154-032	
R217	100K ohm	4704-0104-032	
R218	1.8K	4704-0182-032	
R219	47K	4704-0473-032	
R220	680K ohm 5%	4704-0684-032	
R221	100K	4704-0104-032	
R222	10K ohm 5%	4704-0103-032	
R223	not used		
R224	33 ohm	4704-0330-032	
R225	8.2K	4704-0822-032	
R226	470K	4704-0474-032	
R227	470K	4704-0474-032	
R228	47K	4704-0473-032	
R229	47K	4704-0473-032	
R230	47K	4704-0473-032	
R231	270 ohm	4704-0271-032	
R232	2.7 ohm	4704-0279-032	
R233	680 ohm	4704-0681-032	
R234	2.2K	4704-0222-032	
R235	1K	4704-0102-032	
INTEGRATED CIRCUIT			
IC201	IC FM	3130-5127-100	
IC202	IC Audio	3130-5407-602	
IC203	IC 8V Reg	3130-0000-014	
TRANSISTORS			
Q201	Red top	4801-0000-035	
Q202	Junct fet 2N5668	4811-0000-030	
Q203	2N5130	4801-0000-095	
Q204	SPS 952	4801-0000-010	
Q205	SPS 952	4801-0000-010	

LOCATION		DESCRIPTION	PART NO.	
CRYSTAL FILTER				
XF201		cry filt	2705-3232-200	
XF202		cry filt	2705-1306-600	
XF203		cry filt	2705-3232-200	
CERAMIC FILTER				
CF201		ceramic filter	2700-3209-500	
CRYSTAL				
Y202		crystal	2301-3151-601	
DIODES				
CR201A,B,C,D		silicon IN4148	4805-1241-200	(4 ch)
CR202		silicon IN4148	4805-1241-200	
CR203		silicon IN4148	4805-1241-200	
CR204		silicon IN4148	4805-1241-200	
CR205		silicon IN4148	4805-1241-200	
COILS				
L201A		coil var	1800-3247-203	
L201B,C,D	Range A	coil var	1800-3247-203	(4 ch)
L201B,C,D	Range B	coil var	1800-3247-203	(4 ch)
L201B,C,D	Range C	coil var	1800-3247-203	(4 ch)
L202 A,B,C,D		choke rf 5.6 uhy	1802-0569-008	(4 ch)
L203		choke rf 5.6 uhy	1802-0569-008	(4 ch)
L204	Range A	coil helical 13½T	1800-5129-112	
L204	Range B	coil helical 13T	1800-5129-110	
L204	Range C	coil helical 12½T	1800-5129-111	
L205	Range A	coil helical 13½T	1800-5129-112	
L205	Range B	coil helical 13T	1800-5129-110	
L205	Range C	coil helical 12½T	1800-5129-111	
L206		coil rf	1800-3406-903	
L207		choke rf 100 uhy Airco	1802-0101-008	
L208		coil rf input	1800-3406-902	
L209		coil rf	1800-3406-904	
L210	Range A	choke .47 uhy Airco	1802-0478-008	
L210	Range B	choke .27 uhy Airco	1802-0278-008	
L210	Range C	choke .27 uhy Airco	1802-0278-008	
L211		coil rf (wht)	1800-3191-401	
L212		choke rf 15 uhy	1802-0150-004	
L213		coil rf	1800-6055-801	
L214		choke 5.6 uhy Airco	1802-0569-008	
L215		choke rf 100 uhy Airco	1802-0101-008	
CAPACITORS				
C201A	Range A	10 pf 50V 10%	1500-0100-650	
C201A	Range B	8.2 pf 500V NPO	1500-0829-905	
C201A	Range C	5.6 pf 500V 10% NPO	1500-0569-905	

LOCATION		DESCRIPTION	PART NO.	
C201B,C,D	Range A	10 pf 50V 10%	1500-0100-650	(4 ch)
C201B,C,D	Range B	8.2 pf 500V NPO	1500-0829-905	(4 ch)
C201B,C,D	Range C	5.6 pf 500V 10% NPO	1500-0569-905	(4 ch)
C202A,B,C,D	Range A	.01 mf +8-2 50V	1503-0103-007	(4 ch)
C202A,B,C,D	Range B	.01 mf +8-2 50V	1503-0103-007	(4 ch)
C202A,B,C,D	Range C	.01 mf +8-2 50V	1503-0103-007	(4 ch)
C203		15 pf 10% NPO 50V	1500-0150-650	
C204		.01 mf +8-2 50V	1503-0103-700	
C205	Range A	8.2 pf 10% NPO 500V	1500-0829-905	
C205	Range B	5.6 pf 10% NPO 50V	1500-0569-905	
C205	Range C	3.9 pf 10% 500V	1500-0399-905	
C206		.001 mf +8-2 50V	1503-0102-003	
C207		360 pf 50V 5% LCQ17	1506-0361-550	
C208	Range A	MUD 1 pf 10%	1510-0010-900	
C208	Range B	MUD .68 pf 10%	1510-0688-900	
C208	Range C	MUD .68 pf 10%	1510-0688-900	
C209		.001 mf +8-2 50V	1503-0102-003	
C210	Range A	15 pf CD NPO 50V	1500-0150-650	
C210	Range B	8.2 pf 10% 500V	1500-0829-905	
C210	Range C	6.8 pf 10% 500V	1500-0689-905	
C211		MUD .82 pf 10%	1510-0828-900	
C212		33 pf 10% NPO 50V	1500-0330-650	
C213		.01 mf +8-2 50V	1503-0103-007	
C214	Range A	12 pf CD NPO 500V	1500-0120-605	
C214	Range B	10 pf 10% NPO 500V	1500-0100-905	
C214	Range C	8.2 pf 10% 50V	1500-0829-905	
C215		68 pf 50V 5%	1524-0680-002	
C216		.001 mf +8-2 50V	1503-0102-003	
C217		390 pf 50V 5% LCQ17	1506-0391-550	
C218		.01 mf +8-2 50V	1503-0103-007	
C219		150 pf 5% 50V LCQ17	1506-0151-550	
C220		4.7 pf 10% NPO 50V	1500-0479-905	
C221		4.7 pf 10% NPO 50V	1500-0479-905	
C222		.01 mf +8-2 50V	1503-0103-007	
C223		100 pf 5% 50V LCQ17	1506-0101-550	
C224		2.5-20 pf trim	1517-0000-034	
C225		150 pf 5% 50V LCQ17	1506-0151-550	
C226		68 pf 50V 5%	1524-0680-002	
C227		.001 mf +8-2 50V	1503-0102-003	
C228		.1 mf +8-2 50V	1503-0104-010	
C229		.1 mf +8-2 50V	1503-0104-010	
C230		.47 mf 8-12 BC12	1502-0474-006	
C231		10 pf 10% NPO 50V	1500-0100-605	
C232		.001 mf 100V 10%	1508-0102-610	
C233		not used		
C234		.1 mf +8-2 50V	1503-0104-010	
C235		150 pf SM 50V	1506-0151-550	
C236		150 pf CD 500V	1523-0151-001	
C237		150 pf CD 500V	1523-0151-001	
C238		.005 mf CD +8-2 50V	1503-0502-005	
C239		.0047 mf 100V 10%	1508-0472-610	
C240		.47 mf TANT	1515-0478-003	
C241		.0047 mf 100V 10%	1508-0472-610	
C242		.05 mf +8-2 25V	1502-0503-004	
C243		.005 mf +8-2 50V	1503-0502-005	

LOCATION		DESCRIPTION	PART NO.
C244		220 mf 16V 85D III Type U	1513-0221-002
C245		220 mf 16V 85D III Type U	1513-0221-002
C246		.1mf +8-2 50V	1503-0104-010
C247		1000 mf 16V Type U	1513-0102-002
C248		1 mf 16V 85D III Type U	1513-0010-002
C249		15 pf 10% NPO 50V	1500-0150-650
C250		.068 mf (mylar)	1508-0683-610
C251		.01 mf +8-2 50V	1503-0103-007
C252		.01 mf +8-2 50V	1503-0103-007
C253		.01 mf +8-2 50V	1503-0103-007
C254		.05 mf +8-2 25V	1502-0503-004
C255		.0015 mf 100V 10	1508-0152-610
C256		.1 mf +8-2 50V	1503-0104-010
C257		not used	
C258		150 pf CD 500V	1523-0151-001

5-4 PARTS LIST TRANSMITTER BOARD

LOCATION		DESCRIPTION	PART NO.
CAPACITORS			
C301-C308		not used	
C309		.001 mf 50V	1503-0102-003
C310	Range A	27 pf 5% DM15	1504-0270-505
C310	Range B	24 pf 5% DM15	1504-0240-505
C310	Range C	22 pf 5% DM15	1504-0220-505
C311		not used	
C312	Range A	15 pf 5% 50V	1500-0150-650
C312	Range B	12 pf 5% 500V NPO	1500-0120-505
C312	Range C	10 pf 5% 50V	1500-0100-605
C313	Range A	56 pf RD 50V	1524-0560-002
C313	Range B	47 pf 5% LCQ17 50V	1500-0470-605
C313	Range C	39 pf CD 50V	1500-0390-550
C314		.005 mf 50V	1503-0502-005
C315	Range A	6.8 pf NPO 500V	1500-0689-905
C315	Range B	5.6 pf 10% NPO 500V	1500-0569-905
C315	Range C	4.7 pf CD 50V	1500-0479-905
C316	Range A	120 pf SM LCQ17	1506-0121-550
C316	Range B	100 pf LCQ17	1506-0101-550
C316	Range C	82 pf DM LCQ17	1506-0820-550
C317	Range A	47 pf CD NPO 500V	1500-0470-605
C317	Range B	39 pf 5% 50V	1500-0390-550
C317	Range C	36 pf 5% 50V	1500-0360-550
C318	Range A	4.7 pf CD NPO 500V	1500-0479-905
C318	Range B	3.9 pf 10% 500V	1500-0399-905
C318	Range C	3.9 pf 10% 500V	1500-0399-905
C319	Range A	39 pf CD 50V	1500-0390-550
C319	Range B	33 pf 10% 50V	1500-0330-605
C319	Range C	30 pf CD NPO 50 V	1500-0300-650
C320		.005 mf 50V	1503-0502-005
C321		.005 mf 50V	1503-0502-005

LOCATION		DESCRIPTION	PART NO.	
C322		.005 mf 50V	1503-0502-005	
C323		10 mf 16V Type U	1513-0100-002	
C324		.005 mf 50V	1503-0502-005	
C325	Range A	150 pf SM LCQ17	1506-0151-550	
C325	Range B	100 pf LCQ17	1506-0101-550	
C325	Range C	82 pf DM LCQ17	1506-0820-550	
C326	Range A	300 pf SM LCQ 17	1506-0301-550	
C326	Range B	270 pf LCQ17	1506-0271-550	
C326	Range C	220 pf SM LCQ17	1506-0221-550	
C327	Range A	8.2 pf CD 10%	1500-0829-905	
C327	Range B	6.8 pf 10% 500V	1500-0689-905	
C327	Range C	6.8 pf CD 10%	1500-0689-905	
C328		0033 mf 100V 10%	1508-0332-610	
C329		75 pf LCQ17	1506-0750-550	
C330		.01 mf 50V	1503-0103-007	
C331	Range A	120 pf SM LCQ17	1506-0121-550	
C331	Range B	82 pf 5% NPO 50V	1524-0820-002	
C331	Range C	82 pf 5%	1506-0820-550	
C332		.01 mf 50V	1503-0103-007	
C333		.01 mf 50V	1503-0103-007	
C334		1 mf 16V Type U	1513-0010-002	
C335		not used		
C336	Range A	150 pf SM LCQ17	1506-0151-550	
C336	Range B	100 pf LCQ17	1506-0101-550	
C336	Range C	82 pf SM LCQ17	1506-0820-550	
C337	Range A	300 pf SM LCQ17	1506-0301-550	
C337	Range B	270 pf LCQ17	1506-0271-550	
C337	Range C	180 pf SM LCQ17	1506-0181-550	
C337A		270 pf LCQ17	1506-0271-550	
C338	Range A	8.2 pf 10% 500V	1500-0829-905	
C338	Range B	6.8 pf 10% 500V	1500-0689-905	
C338	Range C	6.8 pf 10% 500V	1500-0689-905	
C339		.01 mf 50V	1503-0103-007	
C340	Range A	100 pf SM LCQ17	1506-0101-550	
C340	Range B	82 pf 5% NPO 50V	1524-0820-002	
C340	Range C	68 pf 5% 50V	1506-0680-550	
C341	Range A	150 pf TC N750	1525-0151-004	
C341	Range B	100 pf 10% 50V	1525-0101-006	
C341	Range C	100 pf 10% 50V	1525-0101-006	
C342	Range A	150 pf TC N750	1525-0151-004	
C342	Range B	100 pf 10% 50V	1525-0101-006	
C342	Range C	100 pf 10% 50V	1525-0101-006	
C343		not used		
C344D	Range A	200 pf 5% 50V N750	1525-0201-004	(4 ch)
C344D	Range A	39 pf 5% NPO 50V	1524-0390-002	(1 ch)
C344D	Range B	33 pf NPO 5%	1500-0330-650	(1 ch)
C344D	Range B	200 pf 5% 50V N750	1525-0201-004	(4 ch)
C344D	Range C	30 pf NPO	1500-0300-650	(1 ch)
C344D	Range C	200 pf 5% 50V N750	1525-0201-004	(4 ch)
C345A,B,C,D		.01 mf +8-2 50V	1503-0103-007	(4 ch)
C346A	Range A	68 pf NPO 50V	1524-0680-002	(4 ch)
C346B	Range A	56 pf NPO 50V	1524-0560-002	(4 ch)
C346C,D	Range A	82 pf NPO 50V	1524-0820-002	(4 ch)
C346A	Range B	56 pf NPO 50V	1524-0560-002	(4 ch)
C346B	Range B	47 pf NPO 50V	1524-0470-002	(4 ch)

LOCATION		DESCRIPTION	PART NO.	
C346CD	Range B	68 pf NPO 50V	1524-0680-002	(4 ch)
C346A,B	Range C	39 pf NPO 50V	1524-0390-002	(4 ch)
C346C,D	Range C	47 pf NPO 50V	1524-0470-002	(4 ch)
C347		.1 mf 50V	1503-0104-010	
C348		10 mf 16V Type U	1513-0100-002	
C349		.01 mf 50V	1503-0103-007	
C350		.01 mf 50V	1503-0103-007	
C351		.01 mf 50V	1503-0103-007	
C352		100 mf 10V Type U	1513-0101-002	
C353		.01 mf 50V	1503-0103-007	
C354		.001 mf 50V	1503-0102-003	
C355		.001 mf 50V	1503-0102-003	
C356	Range A	2.7 pf 10% 50V	1500-0279-205	
C356	Range B	2.2 pf 10% 50V	1500-0229-205	
C356	Range C	1.5 pf 50V	1500-0159-250	
C357	Range A	.01 mf 50V	1503-0103-007	(4 ch)
C357	Range B	.01 mf 50V	1503-0103-007	(4 ch)
C357	Range C	.01 mf 50V	1503-0103-007	(4 ch)
C358		270 pf LCQ17	1506-0271-550	
C359 to C365		not used		
C366		.01 mf 50V	1503-0103-007	
C367	Range A	12 pf 5% DM15	1504-0120-505	
C367	Range B	10 pf 5% DM15	1504-0100-505	
C367	Range C	10 pf 5% DM15	1504-0100-505	

COILS

L301		not used		
L302		ferroxcube	2502-0000-002	
L303		ferroxcube	2502-0000-002	
L304		coil rf	1800-3152-009	
L305		coil rf	1800-3152-017	
L306		not used		
L307		coil rf	1800-3152-018	
L308		coil rf input	1800-3152-002	
L309		coil rf	1800-3191-412	
L310		coil rf	1800-3191-412	
L311A		coil rf var	1800-3247-202	
L311B,C,D	Range A	coil rf var	1800-3247-202	(4 ch)
L311B,C,D	Range B	coil rf var	1800-3247-202	(4 ch)
L311B,C,D	Range C	coil rf var	1800-3247-202	(4 ch)
L312A,B,C,D		choke rf 100 uhy	1802-0101-008	(4 ch)
L313D		choke rf 100 uhy	1802-0101-008	(4 ch)
L314		coil rf input	1800-3152-002	
L315		coil rf	1800-3191-412	
L316		coil rf	1800-3191-412	
L317		fer bead (used w/R306)	2502-0000-001	
L318		fer bead (used w/R306)	2502-0000-001	
L319		fer bead (used w/R315)	2502-0000-001	
L320		fer bead (used w/R315)	2502-0000-001	
L321		choke bead	2502-3254-101	

LOCATION	DESCRIPTION	PART NO.	
TRANSISTORS			
Q301	SPS 952	4801-0000-010	
Q302	not used		
Q303	696-8	4804-3169-608	
Q304	696-5	4804-3169-605	
Q305	MPS A55	4801-0000-001	
Q306	Blue top SPS1476	4801-0000-003	
Q307	Blue top SPS1476	4801-0000-003	
Q308	Blue top SPS1476	4801-0000-003	
Q309	Wt top SPS1539	4801-0000-060	
DIODES			
CR301	silicon IN4148	4805-1241-200	
CR302	silicon IN4148	4805-1241-200	
CR303	not used		
CR304	not used		
CR305	not used		
CR306	not used		
CR307	not used		
CR308	not used		
CR309A	varicap	4809-5420-600	
CR309B,C,D Range A	varicap	4809-5420-600	(4 ch)
CR309B,C,D Range B	varicap	4809-5420-600	(4 ch)
CR309B,C,D Range C	varicap	4809-5420-600	(4 ch)
CR310A,B,C,D	silicon IN4148	4805-1241-200	(4 ch)
RESISTORS (All resistors are 5% ¼W unless otherwise noted)			
R301-R304	not used		
R305	33 ohm	4704-0330-032	
R306	10 ohm	4704-0100-032	
R307	film 3.9K	4704-0392-032	
R308	270 ohm	4704-0271-032	
R309	10K	4704-0103-032	
R310	film 100K	4704-0104-032	
R311	47K ohm	4704-0473-032	
R312	1 meg	4704-0105-032	
R313	film 22K	4704-0223-032	
R314	12K	4704-0123-032	
R315	68 ohm	4704-0680-032	
R316	68 ohm	4704-0680-032	
R317	film 470 ohm	4704-0471-032	
R318	100 ohm	4704-0101-032	
R319	4.7K ohm	4704-0472-032	
R320	47K ohm	4704-0473-032	
R321	10K	4704-0103-032	
R322	470K	4704-0474-032	
R323	var 10K	4751-3407-101	
R324	10K	4704-0103-032	
R325	100 ohm	4704-0101-032	
R326	100 ohm	4704-0101-032	
R327	not used		

LOCATION	DESCRIPTION	PART NO.	
R328	1.8K	4704-0182-032	
R329	2.2K	4704-0222-032	
R330	220 ohm	4704-0221-032	
R331	5.6K	4704-0562-032	
R332	film 22K	4704-0223-032	
R333	not used		
R334	47K ohm	4704-0473-032	
R335	not used		
R336A	res comp (only) 15K ¼W 10%	4700-0153-042	
R336B,C,D	res comp (only 15K ¼W 10%	4700-0153-042	(4 ch)
R337A	47K ohm	4704-0473-032	
R337B,C,D	47K ohm	4704-0473-032	(4 ch)
R338	47K ohm	4704-0473-032	
R339D	470 ohm	4704-0471-032	(4 ch)
R340	wire wound 100 ohm 2W 5%	4707-0101-031	
R341	not used		
R342	not used		
R343	not used		
R344	560 ohm	4704-0561-032	
R345	10K	4704-0103-032	
R346	1K	4704-0102-032	
R347	12K ohm	4704-0123-032	
R348	not used		
R349	3.9K ohm	4704-0392-032	
R350	film 22K	4704-0223-032	
R351	not used		
R352	not used		
R353	1 ohm 1W 10%	4701-0109-045	
R354	not used		
R355	not used		
R356	not used		
R357	not used		
R358A,B,C,D Range A	film 15K	4704-0153-032	(4 ch)
R358A,B,C,D Range B	film 15K	4704-0153-032	(4 ch)
R358A,B,C,D Range C	film 15K	4704-0153-032	(4 ch)

THERMOSTAT

ST301	thermostat	5301-3407-601

INTEGRATED CIRCUIT

IC301	IC LM358N	3130-3167-909

LOCATION	DESCRIPTION	PART NO.	
RESISTORS	(All resistors are .5% ¼W unless otherwise noted)		
R201	not used		
R202A	4.7K res comp (only) ¼W 10%	4700-0472-042	
R202B,C,D	4.7K res comp (only) ¼W 10%	4700-0472-042	(4 ch)
R203	470 ohm	4704-0471-032	(4 ch)
R204	100 ohm	4704-0101-032	
R205	4.7K	4704-0472-032	
R206	10K ohm	4704-0103-032	
R207	100 ohm wire wound 2W 5%	4707-0101-031	
R208	1K ohm	4704-0102-032	
R209	4.7K ohm	4704-0472-032	
R210	3.9K	4704-0392-032	
R211	470 ohm	4704-0471-032	
R212	680 ohm	4704-0681-032	
R213	1K ohm	4704-0102-032	
R214	33 ohm	4704-0330-032	
R215	47K	4704-0473-032	
R216	150K	4704-0154-032	
R217	100K ohm	4704-0104-032	
R218	3.9K	4704-0392-032	
R219	not used		
R220	680K ohm	4704-0684-032	
R221	not used		
R222	6.8K ohm	4704-0682-032	
R223	not used		
R224	not used		
R225	8.2K	4704-0822-032	
R226	470K	4704-0474-032	
R227	470K	4704-0474-032	
R228	47K	4704-0473-032	
R229	47K	4704-0473-032	
R230	47K	4704-0473-032	
R231	270 ohm	4704-0271-032	
R232	2.7 ohm	4704-0279-032	
R233	680 ohm	4704-0681-032	
R234	2.2K	4704-0222-032	
R235	1K	4704-0102-032	
R236	1.2 ohm	4704-0129-045	
INTEGRATED CIRCUIT			
IC201	sub system IF	3130-6056-500	
IC202	IC Audio	3130-5407-602	
IC203	IC 8V Reg	3130-0000-014	
TRANSISTORS			
Q201	Red top	4801-0000-035	
Q202	2N5668	4811-00-0-030	
Q203	2N5130	4801-0000-095	
Q204	not used		
Q205	SPS952	4801-0000-010	

LOCATION		DESCRIPTION	PART NO.	
CRYSTAL FILTER				
XF201		cry filter	2705-3232-200	
XF202		cry filter	2705-1306-600	
XF203		cry filter	2705-3232-200	
CERAMIC FILTER				
CF201		ceramic filter	2700-3209-500	
CRYSTAL				
Y202		crystal	2301-3151-601	
DIODES				
CR201A,B,C,D		IN4148	4805-1241-200	(4 ch)
CR202		IN4148	4805-1241-200	
CR203		IN4148	4805-1241-200	
CR204		IN4148	4805-1241-200	
CR205		IN4148	4805-1241-200	
CR206		IN4148	4805-1241-200	
COILS				
L201A		variable	1800-3247-203	
L201B,C,D	Range A	variable	1800-3247-203	(4 ch)
L201B,C,D	Range B	variable	1800-3247-203	(4 ch)
L201B,C,D	Range C	variable	1800-3247-203	(4 ch)
L202A,B,C,D		choke rf 5.6 uhy	1802-0569-008	(4 ch)
L203		choke rf 5.6 uhy	1802-0569-008	(4 ch)
L204	Range A	coil helical 13½T	1800-5129-112	
L204	Range B	coil helical 13T	1800-5129-110	
L204	Range C	coil helical 12½T	1800-5129-111	
L205	Range A	coil helical 13½T	1800-5129-112	
L205	Range B	coil helical 13T	1800-5129-110	
L205	Range C	coil helical 12½T	1800-5129-111	
L206		coil 4½T	1800-3406-903	
L207		choke 100 uhy	1802-0101-008	
L208		coil 2½T	1800-3406-902	
L209		coil 3½T	1800-3406-904	
L210	Range A	choke .47 uhy	1802-0478-008	
L210	Range B	choke .27 uhy	1802-0278-008	
L210	Range C	choke .27 uhy	1802-0278-008	
L211		coil wht 13½T	1800-3191-401	
L212		not used		
L213		coil rf	1800-6055-801	
L214		choke 5.6 uhy	1802-0569-008	

LOCATION		DESCRIPTION	PART NO.	
CAPACITORS				
C201A	Range A	10 pf 50V 10%	1500-0100-650	
C201A	Range B	8.2 pf 500V NPO	1500-0829-905	
C201A	Range C	5.6 pf 500V 10% NPO	1500-0569-905	
C201B,C,D	Range A	10 pf 50V 10%	1500-0100-650	(4 ch)
C201B,C,D	Range B	8.2 pf 500V NPO	1500-0829-905	(4 ch)
C201B,C,D	Range C	5.6 pf 500V 10% NPO	1500-0569-905	(4 ch)
C202A,B,C,D	Range A	.01 mf +8-2 50V	1503-0103-007	(4 ch)
C202A,B,C,D	Range B	.01 mf +8-2 50V	1503-0103-007	(4 ch)
C202A,B,C,D	Range C	.01 mf +8-2 50V	1503-0103-007	(4 ch)
C203		15 pf 10% NPO 50V	1500-0150-650	
C204		.01 mf +8-2 50V	1503-0103-007	
C205	Range A	8.2 pf 10% NPO 500V	1500-0829-905	
C205	Range B	5.6 pf 10% NPO 50V	1500-0569-905	
C205	Range C	3.9 pf 10% 500V	1500-0399-905	
C206		.001 mf +8-2 50V	1503-0102-003	
C207		360 pf 50V 5% LCQ17	1506-0361-550	
C208	Range A	1 pf MUD 10%	1510-0010-900	
C208	Range B	68 pf MUD 10%	1510-0688-900	
C208	Range C	68 pf MUD 10%	1510-0688-900	
C209		.001 mf +8-2 50V	1503-0102-003	
C210	Range A	15 pf CD NPO 50V	1500-0150-650	
C210	Range B	8.2 pf 10% 500V	1500-0829-905	
C210	Range C	6.8 pf 10% 500V	1500-0689-905	
C211		.82 pf MUD 10%	1510-0828-900	
C212		33 pf 10% NPO 50V	1503-0330-650	
C213		.01 mf +8-2 50V	1503-0103-007	
C214	Range A	12 pf CD NPO 500V	1500-0120-605	
C214	Range B	10 pf 10% NPO 500V	1500-0100-905	
C214	Range C	8.2 pf 10% 50V	1500-0829-905	
C215		68 pf 50V 5%	1524-0680-002	
C216		.001 mf +8-2 50V	1503-0102-003	
C217		390 pf 50V 5% LCQ17	1506-0391-550	
C218		.01 mf +8-2 50V	1503-0103-007	
C219		150 pf 50V 50V	1506-0151-550	
C220		4.7 mf 10% NPO 50V	1500-0479-905	
C221		4.7 mf 10% NPO 50V	1500-0479-905	
C222		.01 mf +8-2 50V	1503-0103-007	
C223		47 mf 10V 20	1515-0470-002	
C224		not used		
C225		150 pf 5% 50V LCQ17	1506-0151-550	
C226		68 pf 50V 5%	1524-0680-002	
C227		not used		
C228		.1 mf +8-2 50V	1503-0104-010	
C229		.1 mf +8-2 50V	1503-0104-010	
C230		.47 mf 8-12 BC12	1502-0474-006	
C231		.01 mf 100V	1508-0103-610	
C232		.001 mf 100V 10%	1508-0102-610	
C233		33 pf 10% NPO 50V	1500-0330-650	
C234		.1 mf +8-2 50V	1503-0104-010	
C235		150 pf SM 50V LCQ17	1506-0151-550	
C236		150 pf SM 50V LCQ17	1506-0151-550	
C237		150 pf CD 50V	1523-0151-002	
C238		.005 CD +8-2 50V	1503 0502-005	

LOCATION		DESCRIPTION	PART NO.
C239		.0047 mf 100V 10%	1508-0472-610
C240		.47 mf TANT 15V 20%	1515-0478-003
C241		.0047 mf 100V 10%	1508-0472-610
C242		.05 mf +8-2 25V	1502-0503-004
C243		.005 mf	1503-0502-005
C244		1000 mf 16V	1513-0102-002
C245		220 mf 16V 85D III Type U	1513-0221-002
C246		.1 mf +8-2 50V	1503-0104-010
C247		220 mf 16V 85D Type U	1513-0221-002
C248		1 mf 16V 85D III Type U	1513-0010-002
C249		15 pf 10% NPO 50V	1500-0150-650
C250		.068 mf (mylar)	1508-0683-610
C251		.01 mf +8-2 50V	1503-0103-007
C252		.01 mf +8-2 50V	1503-0103-007
C253		.01 mf +8-2 50V	1503-0103-007
C254		not used	
C255		150 pf	1523-0151-002
C256		not used	
C257		.01 mf +8-2 50V	1503-0103-007
C258		150 pf	1506-0151-002
C259		not used	
C260		150 pf	1523-0151-002
C261		.01 mf +8-2 50V	1503-0103-007

5-6 PARTS LIST TRANSMITTER BOARD

LOCATION		DESCRIPTION	PART NO.
CAPACITORS			
C301-C308		not used	
C309		.001 mf 50V	1503-0102-003
C310	Range A	33 pf 5% DM15	1504-0330-505
C310	Range B	27 pf 5% DM15	1504-0270-505
C310	Range C	27 pf 5% DM15	1504-0270-505
C311		not used	
C312	Range A	15 pf 5% 50V	1500-0150-650
C312	Range B	12 pf 5% 500V NPO	1500-0120-505
C312	Range C	10 pf 5% 50V	1500-0100-605
C313	Range A	56 pf RD 50V	1524-0560-002
C313	Range B	47 pf 5% LCQ17 50V	1500-0470-605
C313	Range C	39 pf CD 50V	1500-0390-550
C314		.01 mf +8-2 50V	1503-0103-007
C315	Range A	6.8 pf NPO 500V	1500-0689-905
C315	Range B	5.6 pf 10% NPO 500V	1500-0569-905
C315	Range C	4.7 pf 5% LCQ17 50V	1500-0479-905
C316	Range A	120 pf SM LCQ17	1506-0121-550
C316	Range B	100 pf LCQ17	1506-0101-550
C316	Range C	82 pf DM LCQ17	1506-0820-550
C317	Range A	47 pf CD NPO 500V	1500-0470-605
C317	Range B	39 pf 5% 50V	1500-0390-550
C317	Range C	36 pf CD NPO 50V	1500-0360-550
C318	Range A	4.7 pf CD NPO 500V	1500-0479-905
C318	Range B	3.9 pf 10% 500V	1500-0399-905
C318	Range C	3.9 pf 10% 500V	1500-0399-905

LOCATION		DESCRIPTION	PART NO.	
C319	Range A	39 pf CD 50V	1500-0390-550	
C319	Range B	33 pf 10% 50V	1500-0330-605	
C319	Range C	30 pf CD NPO 500V	1500-0300-650	
C320		.005 mf 50V	1503-0502-005	
C321		.005 mf 50V	1503-0502-005	
C322		.005 mf 50V	1503-0502-005	
C323		10 mf 16V Type U	1513-0100-002	
C324		.005 mf 50V	1503-0502-005	
C325	Range A	150 pf SM LCQ17	1506-0151-550	
C325	Range B	100 pf LCQ17	1506-0101-550	
C325	Range C	82 pf DM LCQ17	1506-0820-550	
C326	Range A	300 pf SM LCQ17	1506-0301-550	
C326	Range B	270 pf LCQ17	1506-0271-550	
C326	Range C	220 pf SM LCQ17	1506-0221-550	
C327	Range A	8.2 pf CD 10%	1500-0829-905	
C327	Range B	6.8 pf 10% 500V	1500-0689-905	
C327	Range C	6.8 pf 10% 500V	1500-0689-905	
C328		.0033 mf 100V 10%	1508-0332-610	
C329		62 pf SM 500V DM15	1504-0620-505	
C330		.033 mf (mylar)	1508-0333-610	
C331	Range A	120 pf SM LCQ17	1506-0121-550	
C331	Range B	82 pf DM 5% NPO 50V	1524-0820-002	
C331	Range C	68 pf 5%	1506-0680-550	
C332		.01 mf 50V	1503-0103-007	
C333		.01 mf 50V	1503-0103-007	
C334		not used		
C335		not used		
C336	Range A	150 pf SM LCQ17	1506-0151-550	
C336	Range B	100 pf LCQ17	1506-0101-550	
C336	Range C	82 pf SM LCQ 17	1506-0820-550	
C337	Range A	300 pf SM LCQ17	1506-0301-550	
C337	Range B	270 pf LCQ17	1506-0271-550	
C337	Range C	180 pf SM LCQ17	1506-0181-550	
C337A		270 pf LCQ17	1506-0271-550	
C338	Range A	8.2 pf 10% 500V	1500-0829-905	
C338	Range B	6.8 pf 10% 500V	1500-0689-905	
C338	Range C	6.8 pf 10% 500V	1500-0689-905	
C339		.01 mf 50V	1503-0103-007	
C340	Range A	100 pf DM LCQ17	1506-0101-550	
C340	Range B	82 pf 5% NPO 50V	1524-0820-002	
C340	Range C	68 pf 5% NPO 50V	1506-0680-550	
C341	Range A	150 pf TC N750	1525-0151-004	
C341	Range B	100 pf 10% 50V	1525-0101-006	
C341	Range C	100 pf 10% 50V	1525-0101-006	
C342	Range A	150 pf TC N750	1525-0151-004	
C342	Range B	100 pf 10% 50V	1525-0101-006	
C342	Range C	100 pf 10% 50V	1525-0101-006	
C343		not used		
C344D	Range A	39 pf 5% 50V N750	1525-0390-004	(1 ch)
C344D	Range A	200 pf 5% 50V N750	1525-0201-004	(4 ch)
C344D	Range B	33 pf N750	1525-0330-004	(1 ch)
C344D	Range B	200 pf 5% 50V N750	1525-0201-004	(4 ch)
C344D	Range C	30 pf N750	1525-0300-004	(1 ch)
C344D	Range C	200 pf 5% 50V N750	1525-0201-004	(4 ch)
C345A,B,C,D	Range A	.01 mf +8-2 50V	1503-0103-007	(4 ch)
C345A,B,C,D	Range B	.01 mf +8-2 50V	1503-0103-007	(4 ch)
C345A,B,C,D	Range C	.01 mf +8-2 50V	1503-0103-007	(4 ch)

LOCATION		DESCRIPTION	PART NO.	
C346A	Range A	75 pf N750	1525-0750-004	(4 ch)
C346B	Range A	68 pf N750	1525-0680-004	(4 ch)
C346C,D	Range A	82 pf N750	1525-0820-004	(4 ch)
C346A	Range B	56 pf N750	1525-0560-004	(4 ch)
C346B	Range B	47 pf N750	1525-0470-004	(4 ch)
C346C,D	Range B	68 pf N750	1525-0680-004	(4 ch)
C346A,B,	Range C	39 pf N750	1525-0390-004	(4 ch)
C346C,D	Range C	47 pf N750	1525-0470-004	(4 ch)
C347		2.2 mf tant 10V 20	1515-0229-002	
C348		10 mf 15V Type U	1513-0100-002	
C349		.01 mf 50V	1503-0103-007	
C350		.01 mf 50V	1503-0103-007	
C351		not used		
C352		100 mf 10V Type U	1513-0101-002	
C353		.01 mf 50V	1503-0103-007	
C354		.001 mf 50V	1503-0102-003	
C355		.001 mf 50V	1503-0102-003	
C356	Range A	2.7 pf 10% 50V	1500-0279-205	
C356	Range B	2.2 pf 10% 50V	1500-0229-205	
C356	Range C	1.5 pf 50V	1500-0159-250	
C357	Range A	.01 mf 50V	1503-0103-007	(4 ch)
C357	Range B	.01 mf 50V	1503-0103-007	(4 ch)
C357	Range C	.01 mf 50V	1503-0103-007	(4 ch)
C358		270 pf LCQ17	1506-0271-550	
C359		150 pf 50V	1523-0151-002	
C360-C365		not used		
C366		150 pf 50V	1523-0151-002	
C367	Range A	12 pf 5% DM15	1504-0120-505	
C367	Range B	10 pf 5% DM15	1504-0100-505	
C367	Range C	10 pf 5% DM15	1504-0100-505	
C368		.1 mf +8-2 50V	1503-0104-010	
C369		.01 mf +8-2 50V	1503-0103-007	
C370		150 pf 50V	1523-0151-002	
C371		.01 mf +8-2 50V	1503-0103-007	
C372		.1 mf +8-2 50V	1503-0104-010	
C373		.1 mf +8-2 50V	1502-0104-005	
C374		150 pf 50V	1523-0151-002	
C375		150 pf 50V	1523-0151-002	
C376		150 pf 50V	1523-0151-002	
C377A,B,C,D		150 pf 50V	1523-0151-002	
C378		not used		
C379		150 pf 50V	1523-0151-002	
C380		10 pf NPO 500V	1500-0100-605	

COILS

L301		not used		
L302		ferroxcube	2502-0000-002	
L303		ferroxcube	2502-0000-002	
L304		coil rf	1800-3152-009	
L305		coil rf	1800-3152-017	
L306		not used		
L307		coil rf	1800-3152-018	
L308		coil rf input	1800-3152-002	
L309		coil	1800-3191-412	
L310		coil	1800-3191-412	
L311A		coil rf var	1800-3247-202	
L311B,C,D	Range A	coil rf var	1800-3247-202	(4 ch)

LOCATION		DESCRIPTION	PART NO.	
L311B,C,D	Range B	coil rf var	1800-3247-202	(4 ch)
L311B.C.D	Range C	coil rf var	1800-3247-202	(4 ch)
L312A,B,C,D		choke, 100 uhy	1802-0101-008	(4 ch)
L313D		choke, 100 uhy	1802-0101-008	(4 ch)
L314		coil rf input	1800-3152-002	
L315		coil rf	1800-3191-412	
L316		coil rf	1800-3191-412	
L317		ferrite bead (used w/R306)	2502-0000-001	
L318		ferrite bead (used w/R306)	2502-0000-001	
L319		ferrite bead (used w/R315)	2502-0000-001	
L320		ferrite bead (used w/R315)	2502-0000-001	
L321		choke bead	2502-3254-101	
TRANSISTORS				
Q301		SPS 952	4801-0000-010	
Q302		not used		
Q303		696-8	4804-3169-608	
Q304		696-5	4804-3169-605	
Q305		MPS A55	4801-0000-001	
Q306		Blue Top SPS1476	4801-0000-003	
Q307		Blue Top SPS1476	4801-0000-003	
Q308		Blue Top SPS1476	4801-0000-003	
Q309		White Top SPS1539	4801-0000-060	
Q310		Not used		
Q311		Not used		
Q312		SPS 952	4801-0000-010	
Q313		SPS 952	4801-0000-010	
DIODES				
CR301-CR308		not used		
CR309A		varicap	4809-5420-600	
CR309B,C,D,	Range A	varicap	4809-5420-600	(4 ch)
CR309B,C,D	Range B	varicap	4809-5420-600	(4 ch)
CR309B,C,D	Range C	varicap	4809-5420-600	(4 ch)
CR310A,B,C,D		IN4148	4805-1241-200	(4 ch)
RESISTORS (All resistors are 5% ¼W unless otherwise noted)				
R301-R304		not used		
R305		33 ohm	4704-0330-032	
R306		10 ohm	4704-0100-032	
R307		3.9K film	4704-0392-032	
R308		270 ohm	4704-0271-032	
R309		10K	4704-0103-032	
R310		100K film	4704-0104-032	
R311		47K ohm	4704-0473-032	
R312		1 meg	4704-0105-032	
R313		var 10K	4751-3407-101	
R314		not used		
R315		68 ohm	4704-0680-032	
R316		68 ohm	4704-0680-032	
R317		470 ohm film	4704-0471-032	
R318		100 ohm	4704-0101-032	

LOCATION	DESCRIPTION	PART NO.	
R319	4.7K ohm	4704-0472-032	
R320	47K ohm	4704-0473-032	
R321	12K	4704-0123-032	
R322	470K	4704-0474-032	
R323	var 10K	4751-3407-101	
R324	10K	4704-0103-032	
R325	68 ohm	4704-0680-032	
R326	100 ohm	4704-0101-032	
R327	not used		
R328	1.8K	4704-0182-032	
R329	2.2K	4704-0222-032	
R330	220 ohm	4704-0221-032	
R331	5.6K	4704-0562-032	
R332	22K film	4704-0223-032	
R333	not used		
R334	47K ohm	4704-0473-032	
R335	15K	4704-0153-032	
R336A	15K res comp (only) ¼W 10%	4700-0153-042	
R336B,C,D	15K res comp (only) ¼W 10%	4700-0153-042	(4 ch)
R337A	47K ohm	4704-0473-032	
R337B,C,D	47K ohm	4704-0473-032	(4 ch)
R338	47K ohm	4704-0473-032	
R339D	470 ohm	4704-0471-032	(4 ch)
R340	100 ohm wire wound 2W 5%	4707-0101-031	
R341	not used		
R342	not used		
R343	not used		
R344	560 ohm	4704-0561-032	
R345	10K	4704-0103-032	
R346	1K	4704-0102-032	
R347	12K	4704-0123-032	
R348	not used		
R349	39K ohm	4704-0392-032	
R350	22K film	4704-0223-032	
R351	not used		
R352	not used		
R353	1 ohm 1W 10%	4704-0109-035	
R354-R357	not used		
R358A,B,C,D	15K film	4704-0153-032	(4 ch)

THERMOSTAT

ST301	thermostat	5301-3407-601

INTEGRATED CIRCUIT

IC301	IC LM358N	3130-3167-909